

Australian Personal Computer

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NET WEALTH

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10

DELL

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Dell Inspiron™ 5000.

KILLER LOOKS

Dell Inspiron™ 3800
pictured in Forest Green

There's an Intel® Pentium® III Processor purring away under the sleek, stylish design of the Dell Inspiron 3800. But what's more, you can choose your processor speed (up to 750MHz), and from four hot colours to suit any style. Then of course there's the benefits of the HyperCool™ venting – it keeps your system cool to enhance performance and longevity; and featuring Intel® Speedstep™ technology – for unprecedented battery life performance. So it looks cool, it stays cool and it performs like a tiger. Now that's hot.

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- Mobile Intel® Pentium® III Processor 700MHz featuring Intel Speedstep™ technology
- **UPGRADE TO:** Mobile Intel® Pentium® III Processor 750MHz \$378*
- 64MB SDRAM ■ 5.0GB¹ Hard Drive
- 14.1" XGA Display ■ 24X CD-ROM
- Microsoft® Windows® 98 Second Edition
- Microsoft® OEM Works Suite 2000
- 56K Modem ■ Carry Case
- 3 Years Limited Warranty (1st Year Next Business Day On-Site Response* With International Coverage¹, 2nd & 3rd Year Collect and Return Service)

Why choose between style and function when you can have both? Dell's Inspiron notebook range gives you the features you need, with the style you want. The sleek and slim Inspiron 5000e, features optional UXGA screens (1500x1200) for even crisper and more vivid images – ideal for viewing presentations, graphics programs and even DVDs. Other features include 8MB video memory (upgradeable to 16MB), Intel Pentium III processors (up to 750MHz), all in a lightweight and stylish design. You'll buy it for its features, but love it for its looks.

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- 14.1" XGA Display
- 56K Modem ■ Carry Case
- Microsoft® Windows® 98 Second Edition
- Microsoft® OEM Work Suite 2000
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'Best Home PC Buy'
July 2000 - Dell Dimension[®] XPS
B1000R SE named 'Fastest PC' on the A
List August 2000 - Dell Dimension[®] XPS
B1000R SE named
'Fastest PC' on the A list
Australian Personal Computer
June 2000 - Dell Precision Workstation
220 won 'Editors Choice Award'

PC World
July 2000 - Dell Dimension[®] XPS T700r
voted #2 in Home PC's Best Buys
July 2000 - Dell Dimension[®] XPS B800R
voted #2 in Home PC's Best Buys
July 2000 - Dell Dimension[®] L500cx
voted #2 in Business PC's Best Buys
July 2000 - Dell Dimension[®] L600r
voted #2 in Sub-\$2000 PC's Best Buys
July 2000 - Dell Inspiron[®] 3800 voted #3
in Power Notebook Best Buys
August 2000 - Dell Dimension[®] B800r
voted #1 in Home PC's Best Buys
August 2000 - Dell Dimension[®] L500cx
voted #1 in Business PC's Best Buys
August 2000 - Dell Inspiron[®] 3800 voted
#3 in Power Notebook Category
*Sept 2000 - Dell Dimension 4100
voted #1 Business PC's Best Buys
*Sept 2000 - Dell Inspiron[®] 3800 voted
#3 in Power Notebook Best Buys

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- Norton Anti-Virus 2000
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Enter customer-supplied TCP/IP address	•	•	•	•	•	•
Verify network login capability	•	•	•	•	•	•
Perform basic hardware-utility diagnostics and testing	•	•	•	•	•	•
Transfer 200MB data ¹⁴	•	•	•	•	•	•
Disconnect old components, remove cable from network jack	•	•	•	•	•	•
Pack up and remove de-installed equipment	•	•	•	•	•	•
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Dell Dimension™ B Series⁹ photographed with options:
17" flat panel monitor and Altec Lansing ADA 880 speakers.



Dell Inspiron™ 5000



Dell Precision™ 220 pictured with
optional 17" flat panel monitor



Dell PowerEdge™ 2400 Server

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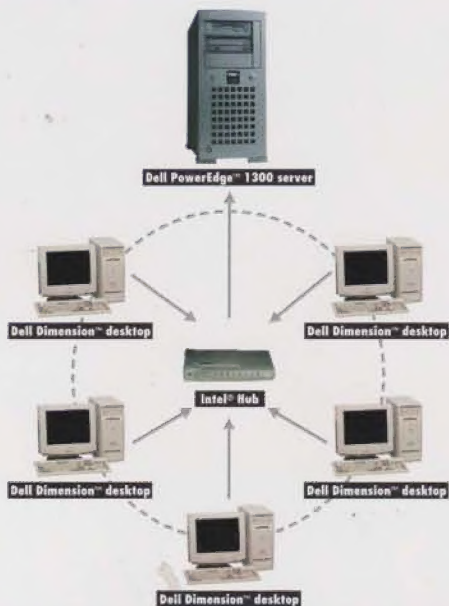
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- High-fidelity Audio SoundBlaster Compatible
- 8X DVD-ROM
- 15" Hi-Res UXGA Screen (1500X1200)
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- Microsoft® OEM Office 2000 SBE
- Leather Carry Case
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- Free Lifetime Telephone Technical Support⁵
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- 12.1" XGA Screen
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Pictured with optional 17" flat panel monitor and Altec Lansing ADA 880 speakers. (subwoofer not pictured)

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3 year Limited Warranty²

Compaq LJ600 USB printer
with free USB cable **\$219(inc GST)**



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NEW: Intel® i815 Chipset
64MB 133MHz SDRAM -
NVIDIA TNT2 M64 16MB AGP Graphics Card
15GB* Ultra ATA Hard Drive¹ (7200RPM)
48X CD ROM Drive¹
Integrated Business Audio
Compaq International V.90 Modem
Microsoft® Windows® 98 SE
Microsoft® Word 2000
Compaq S510 Colour Monitor
3 year Limited Warranty²

Compaq LJ600 USB printer
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Compaq International V.90 Modem
Microsoft® Windows® 98 SE
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Microsoft® Windows® 98 SE
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*Never mind the ebollocks,
we want the facts.*

Buzzword bingo

It looks like it's shaping up to be an interesting few months in the world of IT. Judging by this month's articles, some issues that have been waiting to be resolved are going to get a good airing towards the end of this year. Everybody's trying to figure out what to do about this Internet thing. Control it or kill it seem to be the only two options available to the Old Guard.

The major broadcasters are trying to work out their datacasting strategy — which probably means providing us all with custom set top boxes and remote controls with big red 'buy it now' buttons on the front — and everybody is watching the Napster case for clues on the future of online music. Meanwhile, millions of university students are installing Gnutella.

Telcos have decided the time is ripe to pump some funds into WAP, and Microsoft is morphing itself into Oracle, with Bill 'Larry' Gates telling us that thin clients and distributed, Net-based computing are the future.

It's into this hectic atmosphere that we introduce our new Corporate IT section and bonus cover DVD. The latter has given us the scope to provide previously unthinkable amounts of software and multimedia with this issue. The former aims to educate and inform people involved in corporate IT decision making, and to keep our readers up to date on new high-end technologies.

Corporate jargon can be so abstruse that getting help is always a good idea. I'd almost forgotten the BS that characterises most corporate marketing speak. Finding out what a corporate product is or does is often difficult, because it's nearly always shrouded in buzzwords and propaganda. Spare us. Tell us what a product really does, instead of using vague catch-phrases

like 'providing optimised ebusiness solutions for our customers', or 'Web-enabling business-critical applications'.


Why is this done? Is it because marketing the stuffing out of a product is a better way to make money than building the best technology? Is it because financial decision makers are more interested in overarching promises and 'IT strategies' than nuts and bolts details of how a product actually works? Unfortunately, in many cases both are true (and it's often up to individual IS department workers to make sense of the insane political decisions CFOs make).

Of course, it's not only in the corporate space that this happens. Intel's name for its new instructions in the Pentium III, Internet Streaming SIMD Extensions, is the ultimate in stupid misdefinition. As more computer purchasing decisions are being made by people without in-depth technical knowledge, companies are looking to

Everybody's trying to
figure out what to do
about this Internet
thing. Control it or kill it
seem to be the only
two options available to
the Old Guard.

prey on the ignorance of their buyers. "Making the Internet a whole lot faster." Piffle. A processor is not a magical bandwidth generator. Not content with this act of obfuscation, Intel has gone on to name the new Pentium 4's 'architecture' Net-Burst. Apparently it's also going to make the Internet faster.

Of course, marketing speak has its place — namely on the joke boards of media organisations. The **NewsWire** offices nominate a word of the week, and APC's sub-editors keep a whiteboard filled with their favourite buzzwords. Terms like 'incentivising', 'napsterisation', 'viewers', 'e-transformation' and 'clicks and mortar dot-com etailers' can be found on these lists. I'm no Oxford scholar lamenting the death of the English language, but I wonder if these people realise how ridiculous they sound. ☐



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Life's Good

WORKSHOP

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Bibliofile
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Make the administration of your database easier with ASP



MICROSOFT.NET What's the catch?

Microsoft's much-hyped .Net strategy has been subjected to ridicule and scorn ever since its announcement, but the software giant is pinning most of its future plans on the architecture. Our new Corporate IT section goes on the hunt for a real vision behind all the hype.

In Corporate IT **112**



TARGET: FEMALE Web marketers and the gender divide

As Web sites struggle to turn a profit, online companies are recognising the potential of pushing their sites to specialised markets — and female-friendly sites are the first on the list. What tactics are being used in the Web gender wars, and will they succeed?

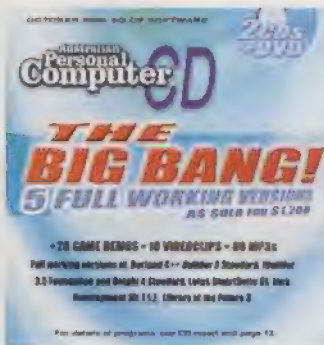
76

Don't brand so close to me



Pop star Sting's recent failure to win back the sting.com domain has serious consequences for other big names, demonstrating the growing clout of the World Intellectual Property Organisation in resolving domain name disputes. But are the new body's rules biased towards larger companies?

In Newswire **30**



FREE DVD *A universe of software*

Along with our two regular cover CDs, this month's issue includes a free DVD, suitable for all PCs with a DVD drive. Special features include five full working versions, 80 MP3s, 10 videoclips, an archive of APC issues and much, much more! Turn to page 12 for the complete details of what's on the DVD.



NET WEALTH *Can you make a fortune online?*

Everyone's heard stories of someone who made a fortune online, but is there really an easy way to wealth on the Web? APC explodes the myths about some of the most popular online business models, including domain name sales, auctions and (gulp) running a porn site.

66

Domain	IP Address	Type	Network	City	Lat	Long
adobe.com	172.16.1.1	WWW	Comcast	San Jose	37.33	-121.89
adobe.com	172.16.1.1	WWW	Comcast	San Jose	37.33	-121.89
adobe.com	172.16.1.1	WWW	Comcast	San Jose	37.33	-121.89
adobe.com	172.16.1.1	WWW	Comcast	San Jose	37.33	-121.89
adobe.com	172.16.1.1	WWW	Comcast	San Jose	37.33	-121.89
adobe.com	172.16.1.1	WWW	Comcast	San Jose	37.33	-121.89
adobe.com	172.16.1.1	WWW	Comcast	San Jose	37.33	-121.89
adobe.com	172.16.1.1	WWW	Comcast	San Jose	37.33	-121.89
adobe.com	172.16.1.1	WWW	Comcast	San Jose	37.33	-121.89
adobe.com	172.16.1.1	WWW	Comcast	San Jose	37.33	-121.89

Who needs Napster anyway?

Recent legal challenges to Napster have only served to draw attention to the wealth of other methods now available for trading MP3s and other files online. APC Labs rounds up and tests all the major contenders, including Gnutella, Aimster and Scour, and also checks out two hot new MP3 players. Meanwhile, Newswire looks into the continuing controversy over online music on page 17.

In First Take 34

MORE POWER TO YOU *The planet's fastest notebooks reviewed*



Using a high-speed notebook no longer means having to compromise on battery life. APC Labs examines five new notebooks that combine the latest processors with longer battery life than ever before.

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AFTER HOURS

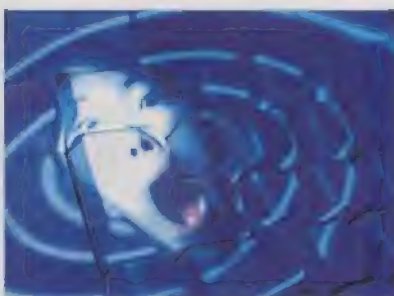
- 201 **GameZone**
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- 210 **From the Stack**
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- 212 **Web File**
Online activist sites for the
politically motivated
- 214 **Random Notes**
It's time for some rock, so turn it
up loud and terrify the neighbours
- 216 **Chip Chat**
Making your PC your best friend
in the kitchen

DVDazzlers



Your PC's DVD drive is ideal for loading software from our cover disc, but for watching movies it's hard to beat a dedicated lounge room player. APC Labs pulls up a beanbag and a remote, and checks out five of the latest models.

In After Hours **206**



Baby come back

System restore software allows you to easily back up your PC's configuration, making it straightforward to recover from crashes, errant applications and badly behaved partitions. We put seven system restoration tools to the test.

104

Climbing the Tower of Babel



Programming tools have made massive advances in recent years, and access to powerful functions is now easier than ever before. APC rounds up the latest C++, Java and Visual Basic tools, and helps you choose the right one for your project.

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A bit steep
- 60 **Service & Reliability**
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- 16 **Contacts**

Conditions of entry

These conditions apply to all competitions in APC October, unless specific conditions are provided with the competition. Instructions on 'How to Enter' form part of the Conditions of Entry of all competitions in APC October. Entry is free and open to all residents of Australia other than employees of ACP Publishing Pty Ltd (ACN 053 273 546), suppliers of competition prizes, their families and associated agencies. The contests close last mail September 12. Enter according to the instructions supplied with the individual competitions. The judges' decision is final and no correspondence will be entered into. No responsibility is accepted for late, lost or misdirected entries. All entries become the property of ACP Publishing Pty Limited, the promoter, 54 Park Street, Sydney NSW 1028. The prizes are not transferable or redeemable for cash. Any change in the value of the prizes occurring between the publishing date and the date the prizes are claimed is not the responsibility of the promoter. Winners will be notified by security post and their names published in APC December.

Summary of prizes page 125

1. Information on how to enter and prizes form part of these conditions of entry.
2. Entry is open to all residents of Australia who subscribe to Australian Personal Computer between 16/08/00 and 5pm on 12/09/00 and PC User between 09/08/00 and 5pm on 05/09/00. Entry is subject to a valid signature against a valid credit card or, if payment is made by cheque, the cheque must be cleared for payment. Subscriptions are to be sent to APC, Reply Paid 3357, Sydney NSW 2001 or PC User, Reply Paid 3357, Sydney NSW 2001, or 13 61 16. Employees and their immediate families of the Promoter and its agencies associated with this promotion are ineligible.
3. The draw will take place at Level 9, Stockland House, 175-183 Castlereagh Street, Sydney, at 11am on 19/09/00.

Winners will be notified by mail and their names will be published in the November issue of APC or PC User respectively. Judges' decision is final and no correspondence will be entered into.

4. The first two valid entries drawn will each win a Versa Lite FX Notebook valued at \$3,753 each. The total prize pool is \$7,506. Prize is not transferable or exchangeable and cannot be taken as cash. Any change in the value of the prize occurring between 27/06/00 and the date the prize is claimed is not the responsibility of the Promoter.

5. The Promoter shall not be liable for any loss or damage whatsoever which is suffered (including but not limited to indirect or consequential loss) or for any personal injury suffered or sustained in connection with the prize except for any liability which cannot be excluded by law.

6. If the winner is under the age of 18 years the prize will be awarded to the winner's parent or guardian.

7. The Promoter may conduct such further draws at the same place as the original draw as are necessary on 02/01/01 in order to distribute any prizes unclaimed by that date subject however to any written directions given under Reg 37 of the Lottery and Gaming Regulations 1993 (SA).

8. The Promoter accepts no responsibility for late, lost or misdirected mail.

9. All entries become the property of the Promoter. All entries will be entered into a database and the Promoter may use the entrants' names and addresses for future promotional, marketing and publicity purposes unless otherwise advised by the entrant.

10. The Promoter is ACP Publishing Pty Ltd of 54-58 Park Street, Sydney NSW 2000. A.C.N 053 273 546.

11. NSW Permit No. TC00/6470, Vic Permit No.00/3006 / Issued on 29/06/00, A.C.T. Permit No. TP99/4921, N.T. 00/2264, S.A. T00/2512

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66 OF SOFTWARE

For a complete listing of software featured on the October DVD and CDs, see the sleeve.

DVD CONTENTS

Five full working versions — including three full working versions of programs from Inprise

Borland C++ Builder 3 Standard

This is a fully integrated C++ development environment with drag-and-drop visual development for building sophisticated C++ applications. The fast 32-bit native code compiler allows you to build efficient executables. It includes over 130 reusable components including menus, dialogs and data visualisation flexibility.

Borland Delphi 4 Standard

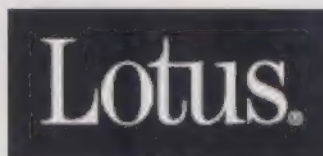
An easy-to-learn, high-performance Windows development tool, Borland Delphi 4 includes drag-and-drop visual programming, Dockable Toolbars, a Visual Component Library of over 85 reusable components, and CodeInsight Wizards that complete the code for you.

Borland JBuilder 3.5 Foundation

This is an all Java environment for developing and deploying Pure Java 2 applications on the platform of your choice. You can easily customise and extend the functionality of JBuilder 3.5 Foundation using the Open Tools API.

Lotus SmartSuite 97

This is the full working version of the integrated office suite Lotus SmartSuite 97. Lotus is also giving APC readers a huge 30% discount on SmartSuite Millennium Edition for a limited time.



Library of the Future 3

Library of the Future 3 is a reference library with over 3,500 complete and unabridged books, stories, plays, poems, religious and historical documents, and children's classics. It also contains hundreds of illustrations and full-motion videoclips. Many of the greats are represented, including the Bible and works from Shakespeare, Tolstoy, Twain, Aristotle, Emerson, Steinbeck, Poe and hundreds more.

CD-ROM City

Multimedia: 80 MP3s, 10 videoclips, videos, animation, Web design and CD-ROM production

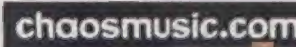
50 free MP3 music tracks from MP3.com.au

Launched in October 1999, MP3.com.au has become a digital music leader in Australia by offering a range of the latest music, news, Internet radio, hardware and software. MP3.com.au aims to serve the music fans and artists who are creating this industry.



30 free MP3 music tracks from ChaosMusic

ChaosMusic went online in 1995 as Chaos Music Market, and it had an initial catalogue of only 200 independent music titles. The site now has a wide range of music covering over 200 genres. The team at ChaosMusic has been active in developing streaming audio and video over the Internet with ChaosRadio and ChaosVision.



Festival Mushroom videoclips

Festival Mushroom has had a long association with the Australian music industry. It has provided three videoclips from Australian artists for APC's DVD.

IdN digital art

Through its magazines and CD-ROMs, IdN (International designers Network) is an inspiration for both aspiring and well-established designers. It provides in-depth studies of how contemporary digital artists arrive at and develop their most creative ideas. Its annual competition receives excellent exposure through the '101 Collection'. This is exhibited at roadshows worldwide, and the 101 Collection catalogue has become a collector's item.



For APC's DVD, IdN has supplied a selection of competition entries in the categories of Video Productions/Animation, Web Design and CD-ROM Production. These are not only inspiring but also great fun.

Random Notes videoclips

Random Notes is a regular section in APC. Every month it profiles artists and features their tracks on the cover CD. Seven

videoclips from artists previously featured in Random Notes are included on the DVD.

Maya

Maya is a leading computer graphics package developed by Alias/Wavefront. As the world's leading innovator of 2D and 3D computer graphics technology, Alias/Wavefront develops award-winning software solutions for the film, broadcast television, corporate video, electronic games, interactive media, visualisation, technical surfacing and industrial design markets. There is also a screensaver which draws on Maya Paint Effects preset designs.



Club Med

All of the works in the Club Med section have come from the imaginations of students in the Online Media Production course at Charles Sturt University, Bathurst.

NASA

The NASA video on this DVD represents a small selection of digital video and animation related to NASA and space exploration.

Archives: back issues

See what was new and exciting in earlier issues of *Australian Personal Computer* magazine. Flick through the pages or read articles of interest from the hand-picked selection on the DVD.

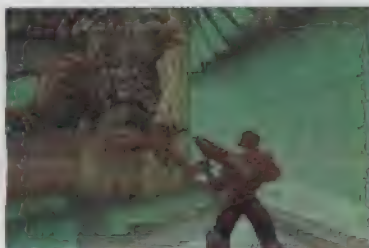
- APC May 1980, Vol. 1, No. 1
- APC June 1980, Vol. 1, No. 2
- APC July 1980, Vol. 1, No. 3
- APC August 1983, Vol. 4, No. 8
- APC January 1985, Vol. 6, No. 1
- APC March 1987, Vol. 8, No. 3
- APC December 1988, Vol. 9, No. 12



Games — 28 demos are included on this month's DVD and CDs

Daikatana

This is the new demo for the long-awaited 3D shooter from Ion Storm. There are three new single-player levels and three multiplayer levels. Other demos on the DVD include



Half-Life: Opposing Force; MDK2; Quake III Arena; Star Trek Voyager: Elite Force; Deus Ex: System Shock II; Thief II: The Metal Age; Vampire: The Masquerade — Redemption; Age of Empires II: The Age of Kings; Combat Mission: Beyond Overlord; Command and Conquer: Tiberian Sun; Dogs of War; Ground Control; Homeworld; Lemmings Revolution; and StarLancer.

Tutorials

Virtual Training Company tutorials

From a range of 100, APC has selected five tutorials to include on the cover DVD: HTML 4, Windows 98, Microsoft Visual Basic 6, JavaScript Fundamentals and C++.

Complete JavaScript APC Workshop

The separate modules have appeared monthly in APC over the last two years. They are presented here in full.

Forte for Java Community Edition 1.0

This program provides a complete set of tools, integrated into a single environment, for developing cross-platform applications and applets written in Java. You can edit, compile, debug, browse and deploy Java programs. This program can be found on the DVD along with the JDK, Java Runtime Environment (JRE) 1.1.8 and Documentation.

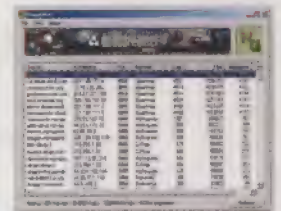
Plus the latest browsers, utilities and shareware for all of the major platforms. You will find everything you need to play, view or read any file on the DVD or CD-ROM. There are also some tools to help you manage your new MP3 collection.



CD CONTENTS

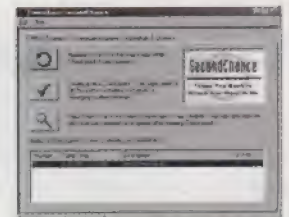
Napster alternatives

There's more than one way to find the MP3s you want, whenever you want, and communicate to a world of music lovers. On CD 1 you will find seven popular download tools: Aimster 1.0, Gnutella 0.56 beta, Hotline Client 1.8.3, iMesh 1.02 Beta Build 118, Napigator 1.14, OpenNap 0.35 and Scour Exchange 3.0 beta 4.2.



System backup and restoration applications

On CD 2 you'll find applications to help you avoid the pain of reinstalling your entire system. As operating systems include more functions and become easier to use, they also contain more bugs and experience more fatal system crashes. The programs included have all been reviewed in APC: Adaptec GoBack 2.2, ConfigSafe 3.0, Norton Ghost 6.0 Enterprise Edition, PowerQuest Drive Image Pro 3.01 and PowerQuest SecondChance 2.



Development tools

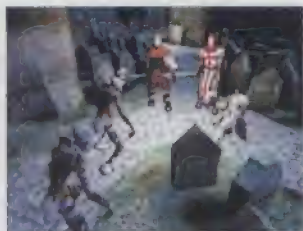
APC has also provided a collection of development tools to create your own Java applets.

Java Development Kit (JDK) 1.1.2

The software and tools in this kit are all you need to compile, debug and run applets and applications written using the Java programming language. APC has included the JDK on CD 2 and the DVD. Other development tools on CD 2 include: Jipe For Windows, PowerJ Learning Edition 2.1 and Thinking in Java.

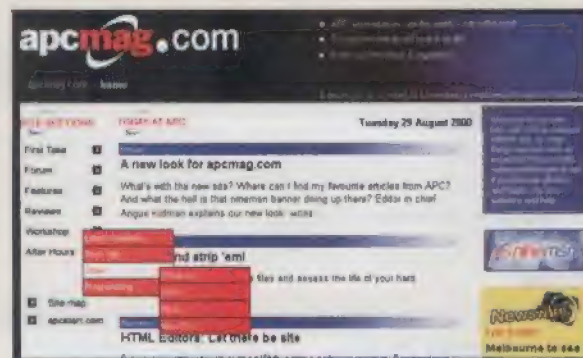
Vampire: The Masquerade — Redemption

The graphics in this third person game are fantastic, with realistic textures and smooth animation. A wounded Crusader left in a convent in Prague to convalesce, you slay a minor vampire and the night brethren take notice of you. They attack you one night, making you one of them. On CD 1 you will also find a great selection of demos including: Dark Reign 2; Scorched Earth 1.5; Shogun: Total War; StarLancer; Subspace 1.35; 3D Ultra Thrill Ride; Airfix Dogfighter; NASCAR Heat; The Rage 0.51; and Tony Hawk's Pro Skater 2.



Our new site

apcmag.com has had a facelift. We've tidied up the site to make it even easier to use, added handy features including a comprehensive search facility and one-click access to column archives from any page, as well as exclusive new online features, competitions and continuous live news feed from Newswire, Australia's technology news site. This month also sees the launch of Xperiment, the new weekly column where editor-in-chief Angus Kidman continues his endeavours in online money-making (see page 70), and the new Linux Wire news service. Check it out today, and let APC know what you think!



WHAT'S ON THE apcmag.com FAMILY OF SITES

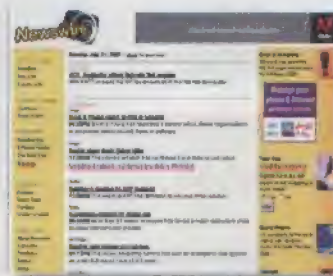


Like its print counterpart, APC's Web site is currently undergoing something of a renovation. We're redesigning the site to make it easier to use and navigate, and planning some exciting new options as well as retaining all of your favourite features, including:

- a complete archive of all magazine content, now in easy to navigate sections;
- reader discussion forums;
- the latest news from Newswire;
- secure online subscriptions;

and much, much more! Stop by apcmag.com this month and let us know what you think.

The recently redesigned Newswire site has all the latest technology news, as well as new features such as interactive reader polls and our weekly Gamespy column. Check it out at newswire.com.au.



Your guide to the cover CDs and DVD

The APC cover CDs complement the magazine and apcmag.com. Each month's disc collection features software related to articles in that issue, as well as special CD-only features and Web browsers.

All software includes instructions on whether you need to unzip the file before installing it, and most also include README files. A complete list of the software on this month's discs is included on the CD cover.

The CDs and DVD have been created in HTML. You do not need any special software to access the discs, other than a standard browser.

The CDs and DVD have been tested using Netscape Navigator 3.0 and 4.0, and Microsoft Internet Explorer 3.0 and 4.0.

All software on the discs is provided as is, without any warranty, express or implied. Complete terms and conditions are included on the CD or DVD; click on the Conditions of Use link for details.

How to run the CDs and DVD

Before using the discs, please read the Conditions of Use online at apcmag.com/apcmag.cd. They use an Autorun feature for Windows 95, 98 and NT systems. Just insert a CD or DVD and your browser will automatically load the APC CD front page. Users of other platforms can launch their favourite browser and load the file DEFAULT.HTM in the root directory of the CD or DVD. For further information, see the instructions on the back of the CD insert.

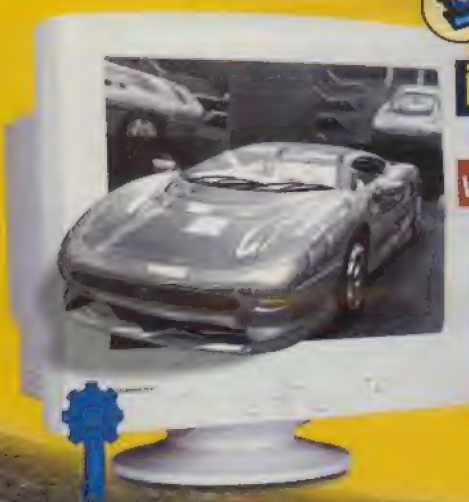
You should read the licensing agreements carefully and honour any evaluation or shareware terms specified, read all instructions and README files, and virus-check every program before use.

While APC has taken every care to ensure that the software is useful and that it works, we cannot accept responsibility or liability for any of the products included.

If you have any problems, refer to the Help section on the back of the CD insert.

And the winner is...

DIAMOND VIEW
2107
21" Colour Monitor



itgraphics
1999 Awards

Windows 2000
1999 Awards

DIAMOND VIEW
DV180
18.1" Colour TFT Monitor



pc world
Best Monitor
Dec '99.

DIAMOND VIEW
1570i
15" Colour Monitor



PC WORLD
BEST BUY
April '99.

DIAMOND VIEW
1995
19" Colour Monitor



Editor's Choice
apcmag
April '99

PC WORLD
BEST BUY
April '99.

DIAMOND VIEW
1772e
17" Colour Monitor



PC WORLD
BEST BUY
April '99.

pc world
BEST MONITOR
Dec '99.



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Contacting APC

For general queries and comments, email is APC's preferred means of communication:

apc@acptech.net

You can also use the feedback form on our Web site:

apcmag.com

Reader inquiries/back issues

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Phone (02) 9288 9123

Email asuzuki@acptech.net

Post APC

PO Box 4088

Sydney NSW 1028

Fax (02) 9264 6320

We run out of most issues quickly, so please contact Akiko Suzuki before sending a cheque.

Cover CDs

If you have any problems with our cover CDs, refer to the Help section on the back of the CD insert.

Reprints and copyright

Contact Heather Milley

Phone (02) 9438 1300

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or visit **apcmag.com**.

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Media releases can be emailed to **newswire@acptech.net**. Please note that due to the volume of mail we receive, we are unable to confirm receipt of releases.

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For full details see our subscription ad on page 120.

Editorial submissions

Please let us know if you have an idea for an article or review you'd like APC to cover.

If you'd like to write for APC, please email **apc@acptech.net** a brief résumé with an outline of your experience and interests, a sample of your writing and an outline of the article you have in mind. We appreciate submissions, but can't guarantee a reply.

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Any similarity between this month's cover and a packet of OMD is purely coincidental.

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Trouble ahead for MP3

Popularity is booming, but threatened by new formats

The MP3 format continues to dominate the online music industry, but there are growing indications that the music industry will turn to other formats or licensing solutions in a bid to curb piracy.

While the most obvious signal has been Napster's ongoing legal woes (as reported in *APC* September, page 20), MP3 hardware manufacturers are being tempted by other formats which provide greater security and hence the possibility of more 'official' licensed content. The music industry is also slowly responding to one of the most common criticisms of CDs: those who want one or two songs by an artist are frequently forced to buy an entire album.

Napster managed to win a stay against an injunction that would have forced it to shut down its service, but the future of the company remains uncertain. To survive in the long term, Napster will need to come up with a more convincing argument than its current defence that copies of songs swapped between individuals should be legal. District court judge Marilyn Patel rejected this argument, and said that the company had to be responsible for the consequences of its actions.

However, many industry watchers believe that a more flexible approach to selling content may reduce piracy. "Downloading and using digital songs needs to be convenient. Present systems just don't work," said Sim Wong Hoo, CEO of Singapore-based Creative Technology, whose Nomad is one of a host of new MP3 players vying for the attention of music lovers (see *First Take*, page 38). "Some require you to accept a legal document before you can legally use tracks — what a joke!"

"The way many companies sell songs on CD now is really not fair. The buyer has to buy several tracks they really don't want just to get the ones they do," said Sim. "But people don't like being ripped off as they see it — so they resort to 'less honourable means' like using MP3s they get off the Internet for free."

Sherman Tam, director of digital content at S3, the maker of the Rio portable MP3 player, said that secure SDMI formats will most likely prevail in the long term, and the Rio has already added support for the Windows Media Audio (WMA) format.

However, Tam said that music labels need to face the reality that revenue will be lost to MP3 piracy. "Many artists get plenty of money through endorsements, not through record sales alone. This makes the Net a much better distribution and exposure vehicle for them, and it's much more effective too."

"MP3 is going to be with us for always now, that's for sure. The only way the record labels can compete is to offer what the consumer wants. It has to be easy, and cost effective," he said.



In Australia, even sites like MP3.com.au are promoting the benefits of WMA. The site will begin selling music online soon, but won't be using MP3. "There's no point. It doesn't protect the artist, it doesn't protect anyone in the long run. When we do start selling music, we'll be doing it in WMA," MP3.com.au vice-president Sam King said.

Meanwhile, local online music site ChaosMusic has proposed that 15% of advertising revenue generated from its Free-Tracks MP3 site be returned to copyright owners such as songwriters, publishers, artists and record labels. It has sent a letter to record companies outlining the proposal.

Jeremy Torr, Angus Kidman and William Maher

News roundup

ASIC lays down rules for online chat

The Australian Securities and Investment Commission (ASIC) has proposed strict regulations to control online investment chat rooms. The draft policy will ban licensed financial advisors from operating investment chat rooms and require content on the sites to carry prominent warning signs. ASIC will also restrict advertising and the use of hyperlinks in chat rooms. "ASIC is seeking to strike a balance between allowing people to communicate freely with each other, inform themselves about securities and minimising the risk that sites may be used to manipulate markets, trade on inside information or take advantage of less well-informed investors," said ASIC commissioner Jillian Segal.

PlayStation2 Oz release date confirmed

Australians will have to wait until the last day of November before they can purchase Sony's much-promoted PlayStation2 game console. PlayStation2 will be marketed in Australia at a recommended retail price of \$749. In conjunction with the launch, Sony will also release up to 25 PlayStation2 games, and expects to have a total of 40 games available by Christmas. PlayStation2 was initially earmarked for an October release date in Europe, North America and Australia. However, Sony has now confirmed the date will now be November 30 in Australia. This follows Europe by a week, and Japan by nine months.

Reckon culls online activities

Accounting software company Reckon will review its online activities after the ebusiness amassed \$6.6 million in losses and less than half a million dollars in revenue in the last six months. Reckon chief executive officer Greg Wilkinson said he will turn the company's online venture, Quicken.com.au, into a profitable business within 12 months or shut it down.

GST hits PC sales

Volumes slump despite consumer boom

Consumers who were waiting for cheaper post-GST prices seem to have caused a slump in PC shipments in Australia during the first half of the year.

Analyst group Gartner reports local PC shipments in the second quarter of 2000 fell by 4% compared with the same quarter last year. However, other countries enjoyed strong growth in PC sales, and the number of shipments in the Asia-Pacific region increased by 26%.

Australia is estimated to have had just over 13% of the region's PC shipments for the second quarter, a figure not helped by the introduction of the GST. Gartner officials argued that many large companies decided

not to buy PCs before July, when the GST lowered the cost of hardware. Gartner predicts the trend will reverse in the second half of 2000. Analysts also said the region is on track to ship more than 18 million PCs. This is a 12-month increase of 35%.

Gartner's figures echo an earlier report by IDC, which said that first-quarter shipments had fallen 16.6% since the previous year. The only top-five manufacturer to increase local PC shipments since the 1999 final quarter was Hewlett-Packard.

"Were it not for the home users who went on a spending spree at the end of the fourth quarter and this quarter as well, the market would have been even more severely affected," IDC analyst Logan Ringland said in May.

William Maher

Ebook advocates continue experiments

While electronic books have yet to set the world on fire, experimentation by publishers and developers in the ebook marketplace continues.

In a widely publicised move, best-selling horror author Stephen King has begun publishing an ongoing electronic novel which he began in an attempt to determine if readers would pay to buy books online. In late July, King launched the first chapter of 'The Plant', an online horror story which readers could download for free in PDF format. King asked each reader to pay \$US1 for the chapter, but didn't force them to do so before downloading the chapter. If there were not enough paying readers, King said he wouldn't continue the book.

A statement on King's Web site said that the experiment had proved a success to date, and he has committed to writing more chapters. "The pay-through rate has been higher than I dared hope," he said. "If we've proved nothing else, we've proved that the guy who shops for entertainment on the Net can be as honest as the one in a retail bricks-and-mortar store." About 76% of the total downloads were paid for.

Despite these numbers, King maintains he's still out of pocket from the experiment. Setting up and promoting the project cost \$124,500, and that doesn't include ongoing hosting fees.

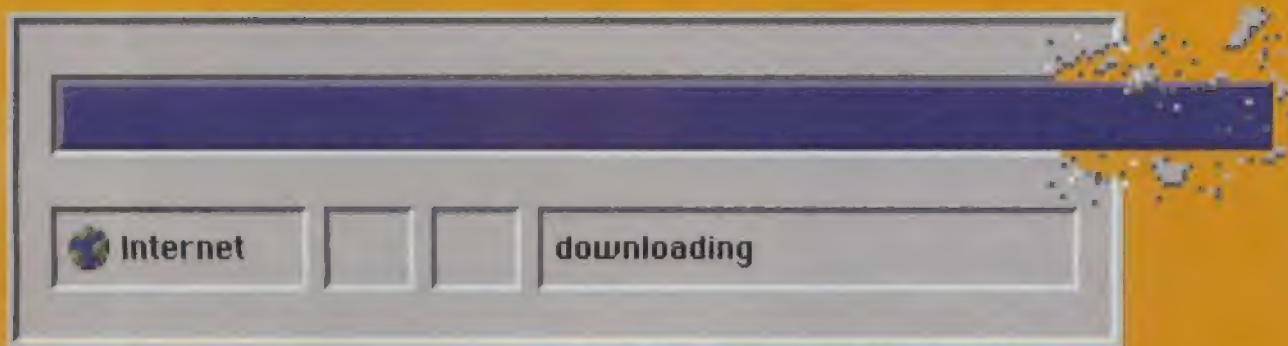
One problem that beset an earlier online project of King's, 'Riding The Bullet', was the instability of ebook reading

software on most PC platforms. Microsoft hopes that it will do better with a Windows version of its Reader package, which has already been issued for its PocketPC range. To promote the new software, the company has formed partnerships with publisher Simon & Schuster and retailer barnesandnoble.com.

Publishers are unwilling to embrace electronic publishing until better copyright protection systems are in place, mindful of the music industry's ongoing battle to control its works. By embedding Reader into Windows, Microsoft may be able to make the concept more popular. Many observers have suggested, however, that electronic books will work better in dedicated handheld readers than in desktop PCs, which have lower quality screens.

Angus Kidman





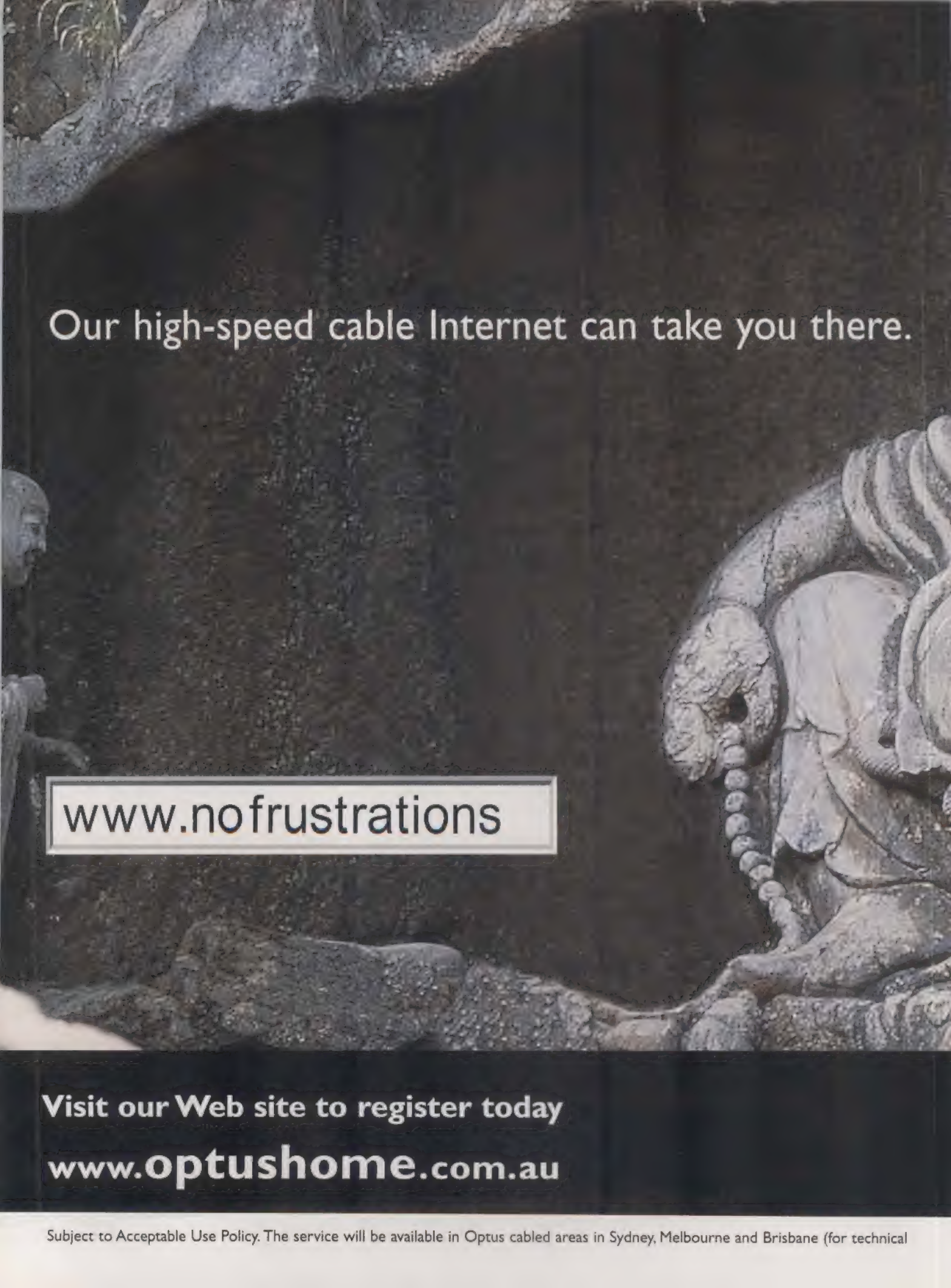
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News roundup

Market not pleased with Melbourne IT

Despite showing substantial improvements in sales and profits, Melbourne IT's half-yearly report was greeted by a 30% dip in its share price. The results show the company is on track to at least meet its prospectus forecasts, as first half earnings before interest and tax were \$3 million compared with a full-year forecast of \$4.7 million. However, investors and analysts seemed more concerned with the warning of a "flattening" in the number of names expected to be registered in the global top level domains (gTLD, eg .com) in the third and possibly fourth quarters of 2000.

Adobe sues Macromedia over interface

Graphics software developer Adobe has taken rival Macromedia to court over a claimed patent violation. Adobe has filed suit against Macromedia in the US District Court, saying that some of Macromedia's products violate its patent on the 'tabbed palette' interface. While many products use tabs on a dialog box to distinguish different operations, Adobe patented its model, which also allows those tabs to be repositioned at will, in 1994. Macromedia has indicated it will fight the suit.

LookSmart defends its ethics

LookSmart chief executive officer Evan Thornley has defended the editorial independence of his new pay-to-list search directory service. LookSmart's Express Submit service charges businesses \$US199 to have a Web site reviewed and listed in the directory. However, Thornley said that a paid listing in LookSmart's directory does not guarantee a higher placement in searches. "We don't do pay-for-placement. We do everything with a separation of church and state," he said. Search results are sorted according to their usefulness to the user, Thornley emphasised.

Still wild about WAP

Usage low, but range expanding

Australian telcos and consumers have been slow to take up Wireless Application Protocol (WAP) initiatives, but this hasn't stopped new companies from providing a range of digital services for consumers on their mobile phones.

Research conducted by Sydney company APT Strategies has found that Australia is lagging behind other countries in the development of WAP services, and currently has less than 10,000 WAP subscribers.

APT Strategies managing director Marc Phillips has accused Australian telcos of failing to exploit the potential of short messaging services (SMS) and portable devices such as the Palm handheld. "Australian telcos do not understand what their mobile phone users want from wireless services," he said.

Despite these sentiments, all kinds of businesses are racing to offer WAP services. However, many don't see them as a major slice of their business — for now.

"We don't expect it to generate huge revenue in the short term," said David Gold, CEO of dstore, which has launched a WAP-only version of its site. dstore is in partnership with Telstra to develop the new service and will target the company's existing base of mobile phone users. Gold believes that WAP shopping will really explode when colour PDAs become more widespread. "You'll really start to see consumers wanting to buy something then," he said.

Telstra rival Optus is hoping to drum up interest in WAP with a series of new content and phone deals. Content on the Optus Mobile WAP network will be sourced from Excite Australia, ninemsn, Start and Yahoo Australia. Optus has also added another five WAP handsets to its range.

According to Finola Thompson, general manager of mobile, Internet and data, this will attract Optus mobile voice customers. "We are taking it right the way down to the mass market," Thompson said.

Since Optus launched its WAP service last November, the company has added a string of new services to its initial program of stock quotes, news and weather. This now includes movie schedules, sports results and a greater degree of personalisation. Thompson said the company is



dependent on manufacturers to make these products, and hence the service, readily available to customers.

Contrary to APT's claims, Thompson said the company has enticed people to use its data service through SMS. In April, Optus launched a free month-long SMS trial for subscribers. The intent of the trial was to make subscribers familiar with what data can offer, on top of already familiar mobile voice products such as caller ID and call waiting. This resulted in a 365% increase in SMS usage. "This is not just about the technology. It is about how we get customers into the WAP technology. And SMS is an easy bridge for the mass market into data," Thompson said.

Numerous other companies are also embracing WAP. Ansett Australia is now providing flight information to Telstra MobileNet customers. Local site Stuff Auctions will soon accept bids from WAP phones. Music retailer Sanity is allowing customers to buy CDs through WAP. Westpac has introduced a WAP banking service, but security restrictions mean that the new service won't be available to all WAP phones on the market. And Microsoft is also working on a version of its 'digital dashboard' for WAP phones and devices.

Fiona Angus, Howard Dahdah and William Maher

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News roundup

Executive shuffle at Corel, Sol 6, Compaq, CA

Corel CEO and founder Michael Cowpland has resigned from the troubled software company, paying the price for a disastrous recent history including the recent failure of its merger with Inprise. Cowpland has stepped down to work on unspecified startup opportunities. He will remain as a director, but will no longer be CEO, president and chairperson. CTO Derek Burney will take over as interim CEO, while the search for a permanent replacement has already begun.

In a slightly less acrimonious departure, CA founder Charles Wang has announced that he will be stepping down as CEO of the company. Wang will continue as chairperson, but will be replaced by current president and COO Sanjay Kumar in day-to-day duties. The switch is part of a larger realignment at CA that will also see it spinning off a new business, iCab-ASP, that will focus on infrastructure for application service providers (ASPs).

Solution 6 has ended its three-month search for a CEO with the appointment of current board member and former Australis and Star City CEO Neil Gamble. "Solution 6 is in a unique position with its leadership in the professional services arena, and I see tremendous opportunity to leverage and strengthen these relationships," Gamble said. The company is planning further acquisitions, despite a mixed track record in that area, and is also still considering a Nasdaq listing. The CEO slot at Solution 6 has been vacant since May, when Chris Tyler resigned after revelations of former drug-dealing convictions.

Meanwhile, Compaq Australia's founding managing director Ian Penman has announced that he will retire in October, ending a 15-year reign at the computer giant. A successor will not be named until Penman's retirement, regional vice-president Paul Chan said, but both internal and external candidates are already being considered.

Oz shuns local sites

Australians continue to prefer overseas Web sites to local content, according to a spate of recent surveys.

The Nielsen//NetRatings monthly survey of Australia's Internet surfing behaviour found that only three of Australia's top 10 most popular Web sites have any local content. During June, the domain with the largest audience was Microsoft's MSN, which had an audience of 1.6 million. Microsoft had a stake in four of the top five Web sites, only losing out on the second position to Yahoo, which had 1.2 million visitors.

The only Australian presence in the top five was ninemsn, which recorded an audience of just under 1 million. ninemsn is a joint venture between Microsoft and Kerry Packer's ecorp, and is the local entry-point to Microsoft's popular Hotmail email service.

Telstra BigPond managed to slip into the number nine position with an audience of 575,000. The only other local pres-

ence in the top 10 was Yahoo's Australian site, Yahoo.com.au, which was ranked sixth with an audience of 638,000.

The top five positions remain the same as those recorded in May, and all Web sites experienced a slight increase in traffic. The rise in overall audience numbers is consistent with the wider results of the survey, which found 3.9 million Australians actively accessed the Internet during June — an increase of 1 million on the previous four months.

The survey mirrored the findings of a Media Metrix survey, which also recorded a surge in traffic to government Web sites during June. ACNielsen found that the popularity of tax-related sites soared in June, ahead of the introduction of the GST. The Australian Taxation Office attracted an audience of 187,273, making it the 36th most popular site. Accounting software developer MYOB also experienced a surge in traffic, attracting an audience of 41,214.

Fiona Angus

Microsoft double-charges on Windows

A study by Gartner has found that Microsoft forces many companies to purchase its operating systems twice. A shift in licensing policy by Microsoft has meant that companies that purchase machines with Windows already installed, but which also have a bulk-buying deal through Microsoft's Select licensing program, are now being forced to buy additional licences for the new machines, Gartner analysts said.

According to the research group, Microsoft previously had no objections if companies that purchased machines with Windows installed wiped the original installation and replaced it with a standard image of the same OS and other applications built from software purchased under a bulk licensing program. 'Reimaging' is used in corporate environments to ensure consistency across all machines.

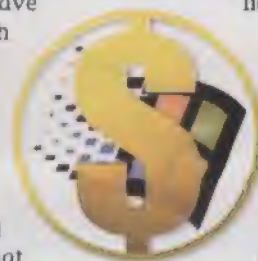
However, Microsoft is now insisting that companies that do this pay a separate

licence fee for the reimaged software. This creates a situation where, potentially, a company could wipe Windows 2000 from a group of newly purchased machines, replace it with identical copies of Windows 2000 and still be forced to pay a new licence fee for each installation.

"Microsoft is benefiting from confusion related to this issue to increase revenue from upgrade licences during contract negotiations," Gartner analysts Alexa Bona and Neil MacDonald said. Microsoft Australia did not respond to repeated requests for comment.

In the consumer space, Microsoft has also backed down on its controversial high price for Windows Me. From September 14, the software's release date, until January 15, Microsoft will offer a special price of \$109 for Windows 98 and Windows 98 SE users upgrading to its new operating system. The new price is well below its recommended retail price of \$206.

Angus Kidman



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Telstra's long-awaited ADSL pricing has pleased few, and it's also put its cable Net users offside with poor service.

Broadband users gun for Telstra

After years of waiting, Telstra has finally launched an ADSL service, but its new pricing plans have come under fire. The company also appears set to alienate its existing customer base of broadband cable users.

As anticipated in *APC* September (page 17), Telstra has announced pricing for its long-awaited ADSL service. Prices for home users with an existing Telstra account begin at \$78 a month for a flat-rate plan, or \$73 a month for usage-based services. Those using a carrier other than Telstra for basic telephone services are charged a premium on top of this rate, a move Telstra is hoping will allow it to retain its dominant share in the residential market.

However, the basic monthly rate tells only part of the story. The installation fee for the service ranges from \$399 for a three-month contract, down to \$189 if the signup is over 18 months. Existing BigPond customers might receive a discount if they already own a Telstra modem.

Telstra has also continued the unpopular approach used in its cable service of distinguishing plans by download volume. Those on the \$73 Blast Off plan are restricted to 250M of downloads a month, and will pay 18.9 cents per megabyte after that. The \$78 Freedom Standard plan is free of download restrictions.

Both services are capped at 256Kbps downstream and 64Kbps upstream. The higher-speed Freedom Deluxe plan, which offers 512Kbps downstream and 128Kbps upstream, costs \$89 a month. Businesses can get even higher speeds (up to 1.5Mbps upstream), but must pay \$116 a month and accept a 500M download limit. Windows and Mac platforms will be supported, but there is no news on a Linux client.

ADSL is expected to be more successful than cable as it can be connected through the standard telephone cable. However, it only works within a limited distance from exchanges, and some areas using pair gain equipment can't use the service. However, Telstra is predicting that by 2002 ADSL will be available to 90% of Australians.

Complaints central

The Internet Society of Australia has already attacked Telstra over its pricing, saying it disadvantages many Australians and fails to maximise the economic and social potential of the Internet. According to executive director Tony Hill, the installation costs and pricing of ADSL will only satisfy power Internet users.

"Many low-frequency users and small businesses will continue to be left on the



wrong side of the digital divide," he said. According to Hill, Australia should follow the example of countries such as Canada, where an ADSL rollout has already begun, providing people across the country with an accessible, high-speed network.

Telstra has also alienated its cable Net users with continued performance problems and changes to the pricing of Telstra BigPond Advance. When angry BigPond Advance (BPA) customers began contacting Telstra with complaints about poor or non-existent response times in August, the company denied there was a problem. However, following an investigation by *APC's* sister publication *NewsWire*, officials conceded that there had been some problems, especially for those in Brisbane.

Telstra officials told *NewsWire* that incorrect equipment setup had caused problems, but these had been fixed. However, customers dispute these claims. Brisbane customers of BigPond's online gaming service Wireplay said they were told that a network upgrade occurred on August 3. However, Simon Wright, owner of Australian broadband user site Whirlpool, said that any fixes seem to have had no effect.

"From what I have been hearing, nobody has seen any quantifiable improvement in network speed or reliability," Wright said. "BPA implemented an IP changeover for Brisbane customers. My cynical guess is that this modification was rebadged as an 'upgrade' simply to appease media begging for a response. I doubt this problem will be fixed soon."

Several customers claim to have contacted the Telecommunications Industry Ombudsman (TIO) as they are tied to 18-month contracts but have not received the promised level of service. A spokesperson for the TIO said the office could not reveal whether complaints about a specific company had been received. Where ongoing issues with a company are uncovered, the TIO is authorised to pass matters to the Australian Consumers Association (ACA) or the Australian Competition and Consumer Commission (ACCC).

Price changes have also upset BPA customers. BigPond has altered its cable Internet pricing plans to match the ADSL price structure. Bandwidth limitations of 256Kbps downstream and 64Kbps upstream have been placed on the lower-priced Blast Off plan, which was previously uncapped. Blast Off customers pay a penalty rate per megabyte if they transfer over 250M per month, so some customers chose the Freedom plan which offered no charge for data transferred, but capped performance at 400Kbps. The change raised the Freedom downstream speed cap to 512Kbps (with 128Kbps upstream) from September 1, and a cheaper version of Freedom was introduced with the same bandwidth caps as Blast Off.

Simon Vandore, Angus Kidman and Howard Dahdah

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*Sting's recent failure to win back the sting.com domain
has serious consequences for other big names.*

Don't brand so close to me

When Gordon Sumner, the artist known as Sting, lost his appeal for the rights to the sting.com domain name on July 20, the World Intellectual Property Organisation (WIPO) made a landmark decision.

The findings were announced by University of Melbourne technology law expert Dr Andrew Christie, who is on WIPO's panel of neutral arbiters. Sting had complained that '=Sting=', a US online games fanatic otherwise known as Michael Urvan, was not entitled to own the domain name because the musician owned a trademark on the word.

In his defence, the gamer argued that there are 20 other trademark registrations of the word 'sting' in the US and the word is part of everyday English. Urvan denied he was trying to cause any confusion between Sting and himself, and claimed to have used the nickname online for eight years.

The songwriter countered that Urvan was a cybersquatter. The gamer had pointed the domain name to an auction site for the person-to-person sale of firearms in an apparent attempt at black-mail, while trying to sell the rights to sting.com for \$US25,000.

Christie found that this had been an error on the part of Urvan's ISP (though it later emerged that Urvan's brother owned the gun site). He found that the domain name had not been registered in bad faith, and it was not proven that Urvan had registered the domain to force the musician to buy it from him at a high price. Although evidence of Urvan's right to use the name =Sting= online was "at the weaker end of the spectrum" and he probably shared the name with dozens of other gamers, Christie found that simply being world famous under a name which was also a common English word did not give Sting the right to call it his own.

The sting.com case is a high-profile example of the hundreds of domain name decisions recently handed down by WIPO, which is funded by the United Nations and based in New York. In determining who owns a domain name, WIPO follows the Uniform Domain

Name Dispute Resolution Policy set down by the Internet Corporation for Assigned Names and Numbers (ICANN), which requires complainants to prove that the domain was registered in bad faith and establish prior association with the name.

The precedents set by the application of these rules are what truly govern domain names. In an earlier case determined by Christie, Telstra won back the rights to the domain telstra.org from a mysterious NSW company called Nuclear Marshmallows. That decision now serves as a benchmark for new cases.



▲ Sting: "It's always me who ends up getting wet."

"It is not possible to conceive of any plausible actual or contemplated active use of the domain name by the Respondent that would not be illegitimate, such as by being a passing off, an infringement of consumer protection legislation, or an infringement of the Complainant's rights under a trademark law," reads the Telstra vs Nuclear Marshmallows decision. As 'Telstra' was an invented word, the proof of this was easy to establish; Christie quoted dictionary definitions of the word 'sting' to show that this did not apply to the more recent decision.

The .org namespace is intended for non-profit organisations, and although Telstra is a business, the WIPO took the position that use of a trademark in any type of domain name falls under ICANN's rules.

=Sting=, the gamer, now has some hot property in sting.com. No less than four banner ads and a promotional blurb for a bank fill his front page, and the site also contains busy discussion forums where his supporters duke it out with fans of Sting. He is planning to add polls on a variety of controversial topics, and is a vocal advocate of free online music distribution.

As the WIPO and ICANN rules have usually led to decisions favouring the trademark holder, this is seen by some as pandering to big business. However, a study of the case documents shows a logical pattern has emerged.

Companies with names including BuyThisDomain-Name, Net-Promotion and DomainHouse.com are clearly cybersquatters and usually lose their cases. The same goes for companies which have registered their rivals' products as domain names. However, similar cases have also gone the other way, for example, the case of Interactive Television versus Noname.com over the possession of the interactivetv.com domain.

The theft of a domain name takes cunning. Simply going out and registering coca-cola.org will get you nowhere unless the name on your birth certificate happens to be Coca-Cola. Penguin Books had a harder time of it: the publisher lost its case

against the Katz family who had registered penguin.org, apparently out of an interest in the flightless bird; while InterContinental Hotels failed to secure the domains intercontinental.com and intercontinental.com.

Another trend is to register misspellings of a popular domain name, such as yahoo.com, aamazon.com, or even wwwreuters.com — often 20 variants at a time. These too have usually gone back to the trademark holder, because it is clear they were registered in bad faith. However, if the misspelling happens to result in a real word that is not trademarked, the cybersquatter has struck gold.

Simon Vandore

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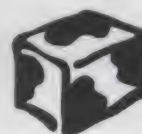
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Who needs Napster anyway?

Despite the fact that online MP3 service Napster is facing a legal battle (see 'Trouble ahead for MP3', page 17) and other services such as CuteMX are closing to avoid court action, download clients and servers continue to expand at a great rate. It's never been easier to download files of all types. **Alex Kidman** and **Darren Ellis** take a look at eight popular download clients to see what they can (and can't) do, and how well they stack up against Napster.

Aimster

www.aimster.com

Aimster is a weird program. On its own, it's a good looking instant messaging client with file searching and sharing capabilities, very much like Napster. Unfortunately, Aimster does not work on its own; it needs AOL Instant Messenger (AIM) running in the background to function. AIM already supports file sharing within its program structure, which is as easy as right-clicking on a buddy. So what does Aimster add to AIM that isn't already there?



In a nutshell, search capabilities. According to the Web site, Aimster is capable of searching through AOL File Sharing and Gnutella, and Microsoft Net-

working support is forthcoming. We were unable to connect to the Aimster servers to perform any valid searches on the service, but the whole thing seems ancillary to having AIM and Gnutella anyway. The Aimster site acknowledges that the servers are under a lot of strain, so file transfers, searches and connections may be slow or, as in our case, downright impossible.

You can customise the look of Aimster with skins, but this is window dressing rather than adding to its performance. If you're looking to centralise your AIM and Gnutella use, Aimster could be the program for you, but more than likely you'll prefer to stick with what you've already got.

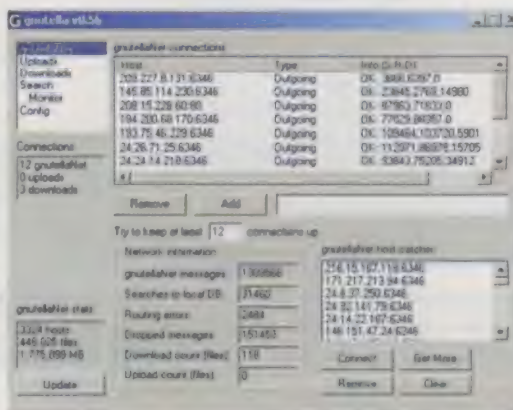
Gnutella

www.gnutella.wego.com

Originally developed by Nullsoft (creators of Winamp), Gnutella has become an open source project with a unique way of sharing files. It's purely a peer-to-peer system; there are no servers to connect to or directories to access. It also serves more than MP3s; any type of file can be shared.

File queries are passed from PC to PC through the network until all nodes are reached. When a PC is found that has the requested file or files, it responds directly to the original PC, indicating file availability. If the file is requested, a direct link between the two is set up and the file transfer begins. It also supports streaming.

The advantage of this system is simple: no server or company means no way to track downloads. On the downside,



several hackers have already found ways to exploit the system and send back false responses that lead the querying system to porn sites or viruses.

The trickiest part of Gnutella is getting connected. To join GnutellaNet you need to know the address of another system on the Net that you can 'plug into'. The Gnutella home page has a list of common access points, but these do not always work well. Once connected, the interface is easy to use, but Gnutella can be slow to perform queries.

Probably the most popular file sharing system besides Napster, Gnutella frequently has terabytes of files of all kinds (mostly MP3s) available, but this varies dramatically depending on the number of people connected.

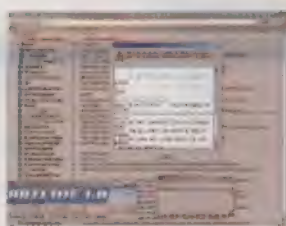
There are several Gnutella clones and variants (all use the same protocol and are interoperable) available at the Web site. Clients are available for Windows, Linux, Java, Mac, BeOS and even Perl.

HotLine

www.bigredh.com

HotLine takes the standard client/server model and extends it into a many-clients/many-servers model. Both the client and server software are available for download, and setting up a HotLine server is relatively easy. Likewise, connecting to servers is simple. Certainly, it's nowhere near as complicated as a product like Gnutella.

The HotLine model is a lot closer to FTP serving than file sharing. It's only possible to be connected to one HotLine server per session, and many files can be downloaded simultaneously from the one server. How-



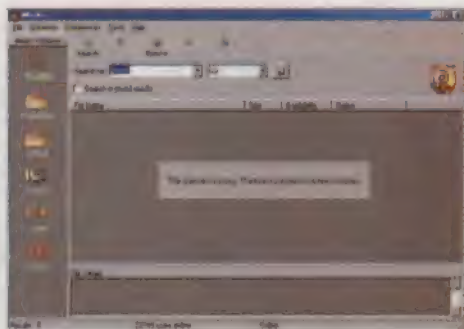
ever, the model is open to a lot of abuse. A common tactic is to overstate the speed of your connection. Another is to put a password on your server, then force potential downloaders to click on banner ads to find out the password.

The reason for all this runaround? Most of the content on HotLine is copyright and a large amount of it is pornography. If that's your thing, and you can deal with the many-servers model, HotLine isn't a bad option. It began life as a Mac-only client, but a PC client has also been developed.

Imesh

www.imesh.com

Napster might have started the trend for MP3 sharing, but most clients go a little further, allowing you to download files of other types. Imesh promises this, along with a neat feature that other download tools would do well to emulate — multiple streams for a single download. If a file is present on multiple servers, you can download portions of it from all available servers, speeding your overall download time. For those who must have individuality, Imesh



also supports skins for a number of different interface designs. There's even a Winamp client to extend your MP3 searching just that little bit further.

Imesh has a reputation for being hard to access. Setting it up is simple enough, and is based on an ordinary Windows executable (Mac and Unix versions are planned). Connecting to the server is another matter entirely. APC continually received a message that 'The

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server is busy. Please try again in a few minutes'. No matter when we tried, or from what connection, the response was the same. This demonstrates one area where client/server download models can really fall down: it's no use having the best features and the most files if nobody can get to them.

Napigator

www.napigator.com

Not a download client as such, Napigator is a tool for searching out any 'nap' server that is currently online — from Napster to the new OpenNap (see OpenNap, page 36). As Napigator is a server tracker, you need one of the available 'nap' clients to work alongside it.

Napigator's window provides up-to-date statistics on the online servers, including how many users are connected to the server, how many files are being shared and how much drive space these files take.

Napigator does not allow you to search for files and file types on the servers listed (this is up to your client of

Server	IP Address	Port	Network	Users	Files	Size (Gbytes)
tel dimensions.com	207.195.111.4	8080	OpenNap	4531	1036153	4161
mvseuka.tcl.org	12.18.122.252	8080	OpenNap	4818	1026175	4121
godharam.com	216.87.221.184	8080	OpenNap	4814	1031260	4144
mp3chanlab.org	209.166.191.64	8080	OpenNap	4504	1031182	4141
bltch dimensions.com	207.195.111.2	8080	OpenNap	4480	1023320	4114
gvrnmentia.squad	207.195.111.6	8080	OpenNap	4488	1033035	4152
varcouche.mynap	209.32.167.10	8080	MyNapster	1857	200627	767
alternative.mynap	64.224.114.33	8080	MyNapster	1529	200217	765
techno.mynapster	53.80.49.5	8080	MyNapster	1398	194189	743
onygen.mynapster	206.128.152.108	8080	MyNapster	1390	198039	761
latin.dnap.it	213.254.1.83	8080	DUNap	475	56482	222
europa.dnap.com	213.254.1.81	8080	DUNap	445	55990	219
devildom.mynap	207.113.81.214	8080	MyNapster	440	53179	211
dnap.dnap.it	213.254.1.80	8080	DUNap	434	58297	215
disapurella.gamel	64.224.136.144	2555	MyNapster	433	99799	214
nut-infest2.ya.org	24.20.21.116	8080	Nakaz2	294	74930	290
buggy.hogspace	64.2.240.2	8080	MyNapster	269	23853	89

choice), but it does give you a good indication of which servers you should be

connected to. Napigator refreshes its information every minute, so you always have current server information, including ping times. If you have a favourite server that is not on the list, you can specify details and Napigator will always include it in its survey.

The only real downside is that it relies on the 'nap' servers (including Napster, OpenNap and MyNap) to function. If the Recording Industry Association of America (RIAA) has its way, these servers may not be around for too long. This would effectively kill Napigator.

Details of Napster servers will be unavailable until the problem with the Recording Industry Association of America (RIAA) has died down.

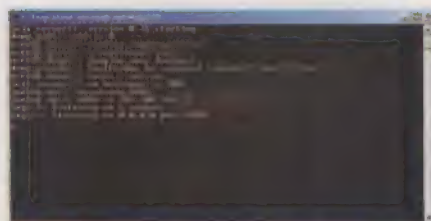
OpenNap

opennap.sourceforge.net

Before you start installing OpenNap on your system, remember that this is a server program, not a client. APC looked at version 0.36 of the program which, although written originally for Unix, has been tested and works on Linux, FreeBSD, OS/2, Windows 95/98, Windows NT/2000 and others. APC found it ran easily on Windows 2000.

Unlike Gnutella, Napster is a server-based MP3 search tool. Clients connect to centralised servers that allow file searching across those users connected. When you find a file or MP3 that you want, the server arranges a client-to-client connection for transfer.

OpenNap is an open source server that increases the use of Napster by allowing any file type to be searched for and trans-



ferred. Its biggest strength is its ability to link multiple servers together. We were able to use OpenNap in conjunction with Napster for file sharing and searching, which worked rather well for several media types. The point-and-click generation may find OpenNap's simple command prompt interface baffling, and although it has a lot of detail, the readme file assumes some prior knowledge.

EDITOR'S CHOICE
Australian
Personal
Computer

Gnutella

Gnutella can be difficult to connect to, but it's very unlikely to be stopped by legal action. It's also minuscule in terms of system resources and content rich. It doesn't have the bells and whistles of instant messaging or a rich graphical interface, but it does have power.

Scour

www.scour.net

Rather like Napster, Scour runs from a central server which links users together to share multimedia files. Scour has also been the focus of some legal action, and it has been keenly trying to forge relationships with the entertainment powerhouses that are seeking to shut it down. Like most other players in the download sphere, Scour is fighting back through its Technology Freedom Center (www.scourfreedom.com).

For the Napster user seeking something simple, Scour excels. It's an extremely easy-to-use client and, in many ways, it's better organised (and certainly



more aesthetically pleasing) than Napster. You can elect to share files, search the files that Scour offers and manage downloads.

It's also a very easy client to follow, with graphical interpretations of downloaded files, the ability to preview downloads as they happen, and rateable ping times to download options.

Scour defines itself as a multimedia download tool, so the usual range of MP3s, AVIs, ASF and MPG files can be found here. It offers a constant supply of licensed content and, of course, there's more than a little copyright material floating around.

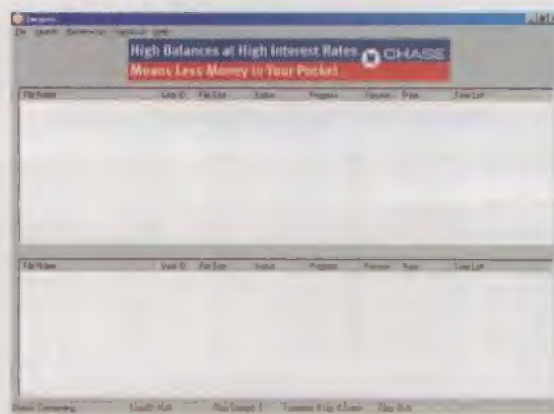
At this stage, only a Windows client is available for download, and even that is only at beta stage. Macintosh and Unix clients are planned, but are not yet available.

Swapoo

www.swapoo.com

Apart from having a rather suspect name, Swapoo has an interesting past. It started out life as Romnet, a file sharing utility for the emulator crowd. It's since expanded to encompass all types of file sharing, although its range of files is still rather small. When APC logged onto the central server, 41G of files were available. This might seem like a lot, but when you consider that Gnutella routinely has several terabytes of data available, Swapoo seems rather pale by comparison.

This particular download client is nothing spectacular, but it's not too mystifying, with screens for down-



loads and uploads, indicating data rates and projected download times. One thing that did put Swapoo in its own category is its insistence that users share at least one directory before logging on. Of course, there's little to stop you sharing a directory with a single text file in it. One thing that Swapoo doesn't do is show ping/speed ratings, so choosing who to download from is pure guesswork.

One factor that will undoubtedly annoy downloaders is that Swapoo serves ads as you use it.

All of the products reviewed here can be found on this month's cover CD.

Full colour, superior economy. \$139.^{RRP}

BRILLIANT PHOTO COLOUR on plain paper, super operating economy, high speed blacks, PhotoRealism and automatic image improvement. You can't go wrong with the super value BJC-1000SP.

Brilliant plain paper photo quality automatically.

The BJC™-1000SP uses advanced colour definition routines for half-tones and areas of low colour density. A separate, selectable function called Photo Optimiser is included in the printer control software.



Before.



After.

It automatically adjusts for defects in exposure, highlights and shadows, and prints accordingly with standard inks designed to optimise quality on low-cost plain paper.

Reduced operating costs.

Using a special resolution matrix, the BJC-1000SP features a Super Economy mode that vastly improves operating economy without the definition sacrifices common to so many draft modes. It effectively quadruples output from both the black and colour cartridges.¹

High quality blacks at high speed.

The optional high capacity black ink cartridge uses 64 print nozzles for high print speeds. The selectable text smoothing mode goes up to 720 dpi to maximise text quality.



Optional BC-03 high capacity black ink cartridge.

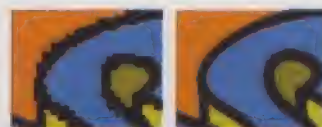
PhotoRealism produces colours between colours.



PhotoRealism™. When superior photographic reproduction counts.

The optional PhotoRealism cartridge is ideal for high resolution paper, glossy photo paper and high gloss film.

Low-density inks vary colour saturation per dot to dramatically increase the colour combinations, reduce graininess and smooth tonal gradations.



Better Internet images.

Image Optimiser, a printer control software feature, can automatically "correct" low-resolution images up to the printer's maximum resolution.

Print banners up to 6 A4 pages long, envelopes, overhead transparencies, T-shirt transfers, and even choose an optional fluorescent ink cartridge for display effects.



BJC-1000SP
Just \$139.^{RRP}

Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support.

For more information call 1800 021 167.



Canon

Creative Nomad Jukebox and S3 Rio 600

Portable MP3 players are not yet as popular as mobile phones, but they're becoming very cool. Two of the best known makers, Creative Technology and S3 (new owner of Diamond) have just released a couple of new models that further expand the market — but in extremely different ways.

The Nomad Jukebox emphasises capacity, with a mammoth 6G of storage space thanks to an IBM/Fujitsu slimline hard drive inside the casing, which looks a lot like a CD player. A special Music Disk Operating System has been designed to cope with and catalogue the 1,500 plus songs the unit can hold, and Creative's EAX environmental audio system is built in. The latter offers the usual graphic equalisation, but adds surround and location simulation effects. The unit can output to four speakers as well as standard stereo, and an infra-red window promises remote operation, although no controller was available to review.

The Jukebox uses a USB connection to download tracks in MP3 format, but not in Microsoft's Windows Media Audio (WMA) format — although the makers point out that the flash upgradable BIOS should enable any SDMI-compliant file formats to be used as they become available. Power is supplied by four high capacity NiMH AA rechargables, and a power supply is included. Standard alkalines can be used, but the high current drain of the hard disk on power-up will flatten them very quickly.

A lock button and volume control, as well as the usual play, stop and fast wind buttons make up the controls. Extra buttons activate the Library (for cataloguing menus and EAX) and access spatial sound controls. A pair of scroll buttons and three soft keys work the LCD menu display.

The Jukebox is very easy to use. It has superb sound, five-minute antiskip, plenty of program and customisation controls, and even an amazing speed adjustment option which keeps voice timbre normal. The PlayCenter2 ripping and uploading software is also top-notch, and noticeably quicker than most others like it. However, navigating the menu was a bit difficult at times, partly due to the small LCD. Despite the overall quality, the cost — while good on a per megabyte basis — is high.



S3's new Rio 600 is also making waves with a (yawn) lifestyle targeted product, complete with obligatory aqua casing and trendy globular styling. Luckily this isn't all the Rio has to offer. It has MP3 and WMA playback, a neat and obvious menu system displayed to good advantage in the ovoid LCD, and simple controls which hark back to the Rio 300 with its four way rocker for play, stop and fast play.

Three extra menu control buttons nestle under the cool blue backlit LCD. The top houses a power/hold switch, as well as the multiway USB and earphone socket. The latter is unprotected and could collect fluff and grit, but is more robust than the mini-USB connectors on some other makes. A single AA alkaline battery sits under the removable back panel, and the coloured front panel snaps off to allow colour scheme (skin) swaps.

No internal expansion for the 32M standard RAM is supplied, but the back panel can be replaced with custom expansion/battery packs that also accept SmartMedia or CompactFlash expansion. The Audio Manager ripping/cataloguing software for both Mac and PC is very slick looking, but not so comprehensive or sophisticated as the Nomad's. The headphones are efficient, but not exactly hi-fi.

Using the Rio 600 is very straightforward. Just switch the power on and press play. The power switch seemed a little flimsy on our review sample and was reluctant to work consistently, but the rest of the controls were solid and the display feedback is very useful. Full info on track type, name, length, bitrate, battery and memory capacity, and menu options are all easy to access and read.

Sound quality was good on both MP3 and WMA playback, and it has the usual basic equalisation options plus a custom bass and treble setting. The battery lasted several hours.

Overall build quality did not compare well with the Rio 500. Gaps between plastic panels contributed to the generally cheaper feel. Despite this, an MP3 player with WMA and flash upgradability for less than \$350 is quite a compelling buy.

Jeremy Torr

Creative Nomad Jukebox

- Pros** Amazing capacity
Superb sound quality
Five minute antiskip
- Cons** Power hungry
Same price as a cheap PC

Contact Creative Labs
Phone (02) 9666 6100
Online www.australia.creative.com
Price \$999 until the end of September; \$1,119 thereafter

S3 Rio 600

- Pros** Lifestyle cool, changeable skins, groovy shape
MP3 and WMA compatible
Attractive price
- Cons** Cheap feel
No expansion slot

Contact Chips
Phone 1300 134 883
Online www.chips.com.au
Price \$349

Big printer performance.

Small printer price & economy. \$189^{RRP}

HIGH RESOLUTION COLOUR, high-speed blacks and superior operating economy with easy to use, broad flexibility for Windows and Mac. Plus optional PhotoRealism and scanner cartridge.



Exceptional results, easily.

The inks are optimised for plain paper with resolutions up to 720 x 360 dpi that can be automatically enhanced with Drop Modulation Technology.TM Variable drop sizes are placed in any of five "strike pattern" combinations to smooth colour gradations and improve tonal quality.



Better Internet images, special effects.

Image Optimiser can automatically "correct" low-resolution Internet images up to the printer's maximum resolution. Turn photos into simulated illustrations and create sepia and mono hues, print banners up to 6 A4 pages long, envelopes, overheads and even T-shirt transfers.



Duplexing, high speed blacks. A new driver allows manual duplex on plain paper with standard inks.

For B&W only, an optional dedicated black ink cartridge with 128 print nozzles offers print speeds up to 5 pages per minute.¹

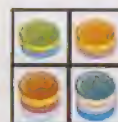


Built-in parallel and USB interfaces for Windows and Mac.¹



Drop Modulation Technology.

Smaller ink drops, about 1/3 the size, are automatically mixed with standard drops to enhance quality.



Layering variable ink densities in each pixel lets you print colours between colours.

5 times the photographic colour combinations.

Optional PhotoRealismTM inks vary the saturation so that a single dot could have 0%, 33%, 67% or 100% of a colour. This produces up to five times as many colour combinations as conventional CMYK inks for better half-tones and less grain.



Canon Customer Care.

The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.



Reduced operating costs.

Super Economy mode uses a special resolution matrix to improve operating economy without the definition sacrifices common to so many draft modes. It effectively quadruples output from both the black and colour cartridges.²

The optional scanner cartridge captures colour photos and text with resolutions up to 360 dpi.



Automatic Image Improvement, easily. Advanced colour routines help define half-tones and areas of low colour density. Photo Optimiser automatically adjusts for defects in exposure, highlights and shadows and prints accordingly.



BJCTM - 2100SP
Just \$189^{RRP}

Canon

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Macromedia Flash 5

Flash is increasingly becoming the standard for Web sites. The viewer plug-in is bundled with Netscape Navigator and Internet Explorer and, according to Macromedia, Flash content is now viewable in 92% of browsers. As a consequence, using Flash is no longer a risk for designers. In addition, the version 5 release has addressed the longstanding complaint that Flash can be frustrating and laborious for designers and developers to use.

Dreamweaver and Director users will immediately notice that the interface has been changed to more closely reflect Macromedia's style. Regular Flash users will probably also notice the Bézier pen tool. This welcome addition means that some illustration can now be done within the Flash environment. MP3 support has been added in this release.

For those who build sites entirely in Flash, there is another major addition — the movie explorer. This is a tree-view panel that shows all the elements used in a movie, organised by scene, allowing you to move around your movie with ease. Another timesaving feature is the ability to import RTF and HTML 1.0 formatted text, including hyperlinks. Text is now easier to edit as well, with a text panel that

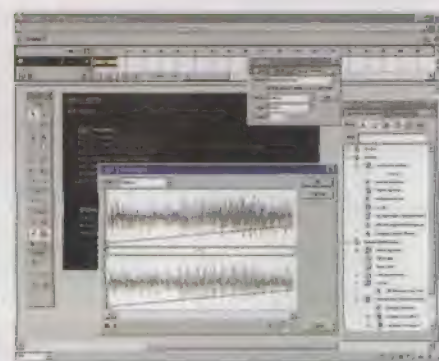
supports copying and pasting as well as font face previewing of selected text.

For interactivity, ActionScript has been seriously updated and uses a syntax similar to JavaScript. You can now define your own functions, use include statements, and import and export code. There are new functions that allow runtime control over audio, and greater control over the mouse cursor. There's also an extremely useful hitTest() function, which performs collision detection — something almost impossible to do in earlier versions. The ActionScript panel is now colour-coded, and the new debugger helps diagnose problems with ActionScripts.

On the server side, Flash 5 is more tightly integrated with Macromedia Generator, allowing dynamic content to be sourced on the server with ease. Additionally, developers who plan on using data-driven information in Flash sites can now use XML formatted data, which can be passed back and forth through open XML socket connections.

The 'medium quality' viewing option helps animations run at nearly twice the speed of 'high quality' without the degradation experienced in 'low quality' mode.

Overall, Flash 5 is a fairly major upgrade that will probably benefit those



- Pros** Easier to use
Better drawing tools
Good scripting engine
- Cons** Flash sites can still be painful on slow connections

Contact Macromedia
Phone (03) 9853 0900
Online www.macromedia.com
Price \$823.90; upgrade \$324.50

who rely heavily on Flash content more than those who just dabble in it. The benefits are primarily productivity based, although there are additional capabilities such as MP3 support.

Daniel Potts

Mambo X

M P3 players have been flooding the market lately. An interesting new-comer is the Mambo X.

The Mambo X can play CD, CD-R and CD-RW discs in either standard CD-audio or MP3 format. As data CDs have a capacity of 650M, it can handle a lot of music, especially using MP3s. It doesn't rival the Creative Nomad in capacity, (see page 38), but is still impressive.

However, the design of the player leaves a lot to be desired. The lid of the unit has an LCD with small buttons arranged below it. The buttons are squashed into the lid of the player, set crookedly, and have to be pressed several times to work. When you squeeze the lid tightly, or press the buttons too hard, you can hear the inside of the lid scraping the top of the spinning disc. The way the lid flops closed under its own weight could also have stood improvement. These problems give the player a cheap feel.

The standard MP3 player has an important advantage over the Discman or Walkman. As it has no moving parts, it can take quite a beating. However, this isn't true of the Mambo X which, although it claims to handle shocks well with Electronic Shock Absorption (ESA), managed to crash on almost every attempt at playback, especially with MP3 files. The player also didn't cope well with hard shocks from the side, which resulted in the disc skipping and reverting to the start of the track.

An AC adaptor comes with the player, although the manufacturers claim a battery life of up to 12 hours. Considering the unit's tendency to crash, it's unlikely you'll last anywhere near that long. Included is a decent pair of headphones, similar to the Sony street style, and an infra-red remote



control. There is also a separate line out for connection to another audio system.

This player is part of the first generation of CD/MP3 players, and better is yet to come. With better solid state MP3 players available, the Mambo X is a must-miss.

Ryan Shaw

- Pros** Long playback time
Can handle CD, CD-R and CD-RW
- Cons** Prone to crashes
Unresponsive
Cheap build

Contact Tagram
Phone N/A
Online www.tagram.com
Price \$US199

I440 dpi, separate transparent ink tanks with monitoring system. \$279.^{RRP}

EXTRAORDINARY QUALITY, superior operating economy, high speed printing plus extra rich blacks, parallel & USB ports for Windows and Mac, optional PhotoRealism and scanner cartridge.

Advanced imaging performance.

Resolution goes up to 1440 x 720 dpi. Drop Modulation TechnologyTM adds variable ink drop sizes that are automatically used in any of five pattern combinations. Then, the printer control software uses colour definition routines more in line with perceptions of the human eye. The benefits are obvious. Sharply defined lines and text. Vivid, more natural looking colours. Subtlety in shaded and highlighted regions with smooth colour gradations.



Colours between the colours with optional PhotoRealism.TM

Low density inks vary the saturation level per dot (e.g. 33% or 67%) for up to five times as many colour combinations as conventional CMYK inks for smoother colour and tonal gradations with vastly reduced grain, even in areas of low colour density.



PhotoRealism produces colours between colours.

High speed printing for all colours, blacker blacks.

Using large print heads and bi-directional printing it prints up to four colour pages per minute. An optional, dedicated black ink tank and cartridge with 160 print nozzles is capable of B&W speeds up to 9 pages per minute.* And the black in both the standard and optional cartridge is an extra-rich black ink.



Automatic Image improvement, broad flexibility, optional scanning. Photo Optimiser adjusts for defects in exposure, highlights and shadows, and prints accordingly. Image Optimiser can print low-resolution Internet images up to the printer's maximum resolution. Print banners up to 6 A4 pages long, envelopes, overhead transparencies and even T-shirt transfers.

Turn your printer into a 720 dpi colour scanner with the optional scanner cartridge, pictured right.



BJCTM - 3000
Just \$279^{RRP}

Parallel and USB interface. Both ports are built-in for Windows and Macintosh.[†]



Transparent ink tanks, "smart monitoring system," superior operating economy.

Standard inks are optimised for plain paper. There are individual, transparent ink tanks for all colours, and each is separate from the print head.

A beam of light measures ink status through a prism moulded into the bottom of the tanks. This allows a printer driver monitor to report on ink levels, and alert you when an ink is running low. You replace only one colour at a time, and don't have to worry about running out of ink.



Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.

Canon

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Maxtor MaxAttach 4000

Network-attached storage systems are becoming increasingly popular for basic file sharing. Complicated NFS or Windows NT servers are no longer required, having been replaced by devices that are the epitome of plug and play.

Last month, APC looked at Quantum's fantastic Snap Server, and this month APC gives Maxtor's MaxAttach NAS device the once-over. It's cheaper than the Snap Server, and provides high-volume file sharing at its most basic.

The MaxAttach supports three file sharing protocols: SMB (Windows file sharing), NFS (Linux/Unix) and FTP. It can also operate in static or DHCP environments; it can even act as a DHCP server. For authentication purposes, it can defer to an NT domain or have its own set of users and groups.

The only application supplied with it is MaxNeighbourhood, a program that finds MaxAttach devices through an Ethernet broadcast and points the Web browser at them to launch the Administration Console. However, the browser-based

Administration Console uses a Java application that played havoc with both Internet Explorer and Netscape Navigator, managing to crash them both. APC finally got it to work, and had the server up and running in three quick steps: date, administration password and Windows workgroup. Once rebooted, controls for user lists, fault notification, services and volumes were available.

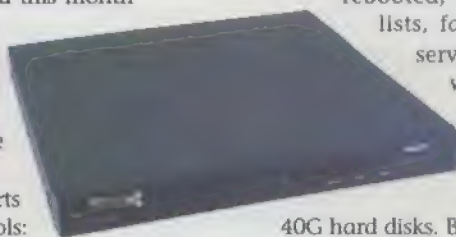
The version of the MaxAttach 4000 APC looked at contained four 40G hard disks. By default, these are set up as a single mirrored volume, providing 71G of total storage on the volume. The only options on the server are mirroring and spanning; the former for maximum reliability (but half the storage space), the latter for maximum storage space (160G in total).

The MaxAttach 4000 comes in a slim case suitable for rack-mounting. It runs a Pentium processor with 128M of memory and a custom, updatable OS. Fast Ethernet is the only network type available, and connecting it to a 10BaseT Ethernet

port produced very poor performance. APC recommends plugging it into full 100Mbps ports only.

The 160G device is available for \$5,750 and there are other configurations. On a cost per megabyte basis, it beat most other solutions available, and should prove adequate if all you want is Windows, NFS or FTP file sharing. Better solutions are available, but the cost increases with the features.

Nathan Taylor



- Pros** Simple to set up and use
Relatively cheap, high volume file storage
- Cons** Limited disk configuration options
Limited protocol support
Can be slow

Contact Maxtor
Phone (02) 9369 3662
Online www.maxtor.com.au
Price 160G model: \$5,750; 240G: \$8,345; 80G: \$3,975; 40G: \$3,370

Microsoft Game Voice

Screaming obscenities at people mid-game is nothing new. Microsoft's Game Voice just takes the shouting to a new level, enabling real time cursing over LAN or Net connections.

The device itself is pretty simple; a set of headphones with microphone attached and a central control hub from which microphone functions can be selected. Installation of the Game Voice is easy; install the software, plug the microphone and speaker jacks into your soundcard, and the control hub into a spare USB port. Game Voice uses MSN Messenger (to track Game Voice users), but there's no specific way to find other users; they have to already be on your contact lists.

Unlike its software, Microsoft's hardware has the reputation of being pretty solid. APC was therefore a little surprised by the poor quality of the headphones, which were rather flimsy. The buttons on

the control hub were not very solidly built either.

Once installed, the Game Voice can be used in a variety of games, for which profiles are provided. It is also possible to create your own. You can address individual participants or the whole team. APC tested the device on a LAN only, and it's not clear how well it would hold up over unreliable modem connections.

Game Voice allows you to use voice commands to activate in game functions. For example, if you're playing Quake, you can say 'Shotgun' to switch to it. The software is reasonably intelligent, and managed to get past quite a few accents, but whether you'd want to rely on it in a life or death situation is another matter. It's also quite slow; the average time to change

weapons was about four seconds. Voice commands can be customised. APC quickly abandoned obvious words and started loading railguns by saying "Feel the bang!" or switching to quad damage with "Because I am that damn good". It's fun for a while, but it does not really enhance the game.

An important disadvantage of the Game Voice is that you have to press more buttons than usual while playing games. It is very fiddly to use a combination of the Game Voice, keyboard, and mouse at the same time.

Alex Kidman



- Pros** Fun to use
Could be used tactically
- Cons** Good manual dexterity needed
Poor quality construction

Contact Microsoft
Phone 13 20 58
Online www.gamevoice.com
Price \$99

Super fast dual print heads, 1440 dpi, 6 ink colours. \$399.^{RRP}

**ULTRA HIGH SPEED,
superior operating
economy, whisper quiet
and brilliant quality.
Plus optional 6-colour
PhotoRealism.**

Advanced print head system.

The compact body utilises a dual print head system designed to satisfy the needs of even the most demanding user. Speed, plain paper quality, extra rich blacks, individually replaceable transparent ink tanks plus optional 6 colour PhotoRealism and high definition colour scanning. The BJC™-6200 offers it all, in one of the quietest printers ever.

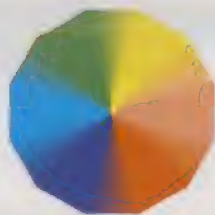


Superior plain paper print quality.
Standard inks are optimised for plain paper. Resolutions go up to 1440 x 720 dpi. Drop Modulation Technology™ automatically adds variable ink drop sizes and the printer control software defines colour more in line with perceptions of the human eye.



PhotoRealism™ with 6 ink colours for even more tonal gradation.

Optional low density PhotoRealism inks may be used simultaneously with standard density colour inks. The 6-colour system delivers life-like reproduction, especially on higher paper grades. Tonal gradations are smooth even in difficult to reproduce colours such as skin tones and light, glossy surfaces.



A smart ink monitoring system alerts users when a colour is running low. There are individual transparent ink tanks for all colours and each is separate from the print heads, significantly reducing operating costs and allowing you to replace only the empty tank.

An optional scanner cartridge delivers resolutions up to 720 dpi.



BJC-6200
Just \$399^{RRP}



Built-in parallel and USB interfaces for Windows and Mac®.

Higher speed. blacker black.

A high performance engine with bi-directional printing capable of up to 3 lines per pass results in monochrome text speeds up to 10 pages per minute and colour printing up to 7 pages per minute, making the BJC-6200 easily the fastest printer in its class.* Plus the black cartridge employs pigment inks for a richer print density with greater water resistance.



Canon Customer Care.

The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.

Canon

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ASUS AGP-V7700 64M DDR GeForce2 GTS

When APC looked at the 32M DDR release of the GeForce2, it was part of a comparative review of video cards in the July issue (see APC July, page 98). It was a very impressive card that almost took the Editor's Choice award, but was beaten by ASUS stablemate, the AGP-V6600 Pro64. APC couldn't wait for the opportunity to put the 64M DDR GeForce2 GTS card through its paces when it was finally released. As the performance of its 32M counterpart was so good, APC expected the 64M model to be excellent.

The card has the same features as the 32M GeForce2 card. It uses the new DDR technology, which effectively doubles the amount of information processed by the card (for a full explanation of DDR technology, see APC July, page 98). The nVidia shading rasterisation (NSR) feature is also included. This is per-pixel rendering that provides absolute control of the smallest detail. A monitoring feature on the taskbar called Smart Doctor allows you to keep tabs on everything about the hardware of the card, from the temperature to the voltage settings. You also get a DVD program and a few game demos, including the full

version of Drakan. The range of features makes a very impressive package.

As for performance, the news is good. Installed in the 650MHz Athlon Pioneer system we reviewed in August, the standard suite of benchmarking programs was run on the card, producing mixed results. The best result was in the processing of 2D video tasks in the Ziff-Davis Business Graphics WinMark 99, where it scored a strong 294.5, considerably faster than the GeForce2 card we tested in July, which used SDRAM. The MPEG-1 WinBench 99 video tests also produced good results, and only one frame was dropped. With 3D images, the card managed only middling performance. Results for TreeMark were excellent, which isn't surprising considering that this test was created by nVidia to showcase the GeForce's capabilities. The quality of the images in the Video2000 benchmark were also a disappointment, scoring only 750. To pro-



vide a comparison, the best score in APC's July tests was 992. This is not to say that the image quality is poor, but the card does not produce the best images you can get for DVD playback.

The 64M card is cheaper than anticipated, despite the renowned costliness of DDR RAM technology. At, \$699, the ASUS AGP-V7700 64M DDR GeForce2 GTS card's price is comparable to cards with half as much RAM. In keeping with this price, the 32M card has also been reduced (from \$690 to \$549).

The card is perhaps not as dazzling as expected, but it is good value for money considering that it has twice the capacity of its competitors at little extra cost.

Fiona Williams

Product	ASUS AGP-V7700 64M DDR GeForce2 GTS
Contact	Cassa
Phone	(07) 5445 2992
Online	www.asus.com
Price	\$699
Graphics processor	GeForce2 GTS
Video memory	64M DDR
Processor speed	166MHz

Benchmark results

Business Graphics WinMark 99	294.5
High-End Graphics WinMark 99	913.5
3DMark 2000	2,086
Video2000: overall score	1,655
Video2000: quality	516
Video2000: performance	750
Video2000: features	599
Expendable lowest/average fps	28/55.3
Quake III: 1,024 by 768 at 16-bit	70.9
Treemark simple/complex fps	28/9.3
viewperf: DX-05	13.69
viewperf: Awadv-03	24.14
viewperf: DRV-06	10.65

The product used in these tests is a shipping version available to the public at the time of publication, unless otherwise stated. Winstone, WinBench and associated programs are registered trademarks of Ziff-Davis Inc. These tests were performed without independent verification by Ziff-Davis, and Ziff-Davis makes no representations as to the results.

Pros Lots of features

Not much more expensive than cards with half the RAM
DDR technology effectively doubles the RAM speed

Cons Performance not as strong as hoped

Contact Cassa

Phone (07) 5445 2992

Online www.asus.com

Price \$699



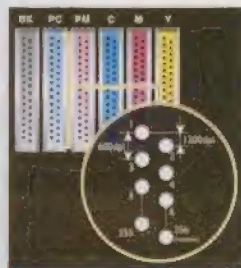
To compare these results to other cards check out the July or August issues of APC, or go to apcmag.com.

Microfine droplets, 1200 x 1200dpi. Just \$699.^{RRP}

ONE MILLION four hundred and forty thousand drops per square inch, 6 ink colours, 4 pico-litre sized drops and 33 tonal levels.

Photo printing with zero-graininess image quality beyond the limits of human eye-sight.

Smaller, better ink droplets.
A unique Canon process called MicroFine Droplet Technology™ produces 4 pico-litre ink drops. Using a special star shaped nozzle each droplet is created to be centre-weighted and near perfectly round for more accurate placement.



Nozzle layout diagram.

Extra large print heads with 6 transparent ink tanks. There are 256 print nozzles per colour for a total of 1,536 on the print head.

This helps resolve the conflict between speed and quality. Separately replaceable, transparent ink tanks and a smart monitoring system help maximise operating economy.



Star shaped nozzle.

High precision dot control.



BJC-8200.

Lower-level technologies.

1200 x 1200 dpi, super low density ink.

Precision placement allows 1,440,000 dots per square inch using inks approximately 1/4 the density of normal inks.

This gives an apparent dot size corresponding to 0.67pl of



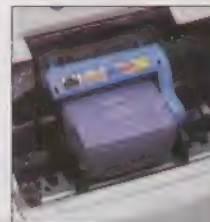
regular ink, enabling photo printing equivalent to approximately 1800 dpi.

SuperPhoto mode, 33 tonal levels.

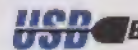
In SuperPhoto mode the BJC™-8200 can print up to 42 ink droplets per pixel (dot). This allows the printer to achieve 33 tonal levels with zero graininess, even in highlights or gradations where dots are normally distinguishable.



SuperPhoto mode with 33 tonal levels.



An optional scanner cartridge delivers resolutions up to 600 dpi.



Parallel and USB interface. Both ports are built-in for Windows and Mac.

BJC-8200
Just \$699^{RRP}

Canon Customer Care.

The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support.

For more information call 1800 021 167.



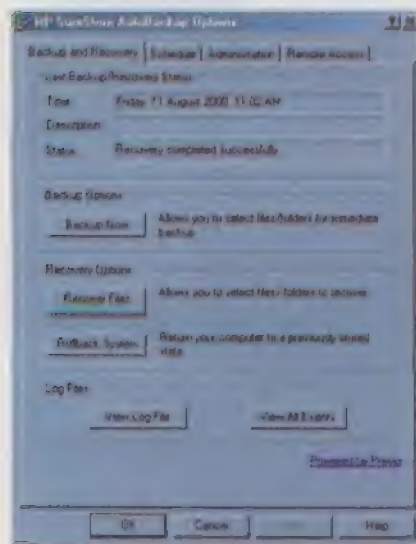
Canon

Hewlett-Packard SureStore AutoBackup

Network-attached backup devices like Hewlett-Packard's SureStore AutoBackup have recently been added to the range of plug and play servers and network-attached storage devices available.

Hewlett-Packard makes two types of AutoBackup: the PC25, which is designed for organisations with up to 25 client PCs, and the PC100 for those with up to 100 computers. Hewlett-Packard claims the PC25 can store up to 60G of data and the PC100 can store up to 240G.

Neither model can be upgraded to add more storage. If you need more storage space, you're expected to buy another one. The SureStore can connect to a variety of tape backup drives, such as DDS-4 and DLT, but is only compatible with devices made by Hewlett-Packard. It also has a CD-R drive, which allows administrators to record recovery/restore disks for each client PC (or set of client PCs).



The SureStore is just like a PC. It has a 466MHz Celeron processor, 128M of memory, and a PCI SCSI card to connect an external tape backup device. The PC25 has one 20G Ultra ATA/66 hard disk drive, and the PC100 has two 30G drives.

It runs a scaled-down version of Windows NT called Windows for Express Networks, which was designed specifically for network-attached server, storage and backup devices. The backups are stored and handled by SQL server, and the front-end software was written by Previo.

Cramming techniques

How does the PC100 fit 240G of data on 60G of storage space? As well as using data compression, the SureStore uses two techniques to maximise its data capacity. The first is called Storage Set Optimisation, which means it does not make duplicate copies of files stored on different computers. The computers on a network share many of the same operating system and application files, as well as copies of the same documents. The AutoBackup only makes one copy of each file.

The second technique is called Delta blocking. This involves analysing the changes made *within* files. If most of the file remains the same, but some information has been added since the last backup — for example, new paragraphs added to a report, or new records to a database — only the additional information is backed up. Because of the lower volume of data, mobile workers can back up their notebooks over a slow connection such as a modem. However, the initial backup can only be done over a network.

The SureStore is very easy to use. Plug it in, turn it on, and you're set. Once the box is up and running, the administrator runs a client program which detects devices and allows them to be configured. All subsequent administration tasks are performed through a Web browser interface. Because they use Ethernet broadcasts for initial configuration, the PCs and the backup device must be on the same subnet.

The administrator then needs to install a client application on each PC to be backed up. Clients are available for Windows 95, 98, 2000 and NT 4.0, but no other operating systems. The client first makes a full backup of the system, and is then set to make regular backups on a schedule determined either by the administrator or by each user. By default,

backups are scheduled by the administrator, but users can be enabled to adjust their own schedules.

The initial backup of the first system can take up to a full day to complete, depend-

ing on the speed of your network and the amount of data to be backed up. The initial backup of subsequent systems is much faster, due to the number of shared files which do not need to be backed up a second time. Automated regular backups only take a couple of minutes.

Individual users can restore files in Windows Explorer, through a folder marked HP AutoBackup. This keeps a list of all the files that have been backed up, and you can choose to look at the most recent version of each file, or all of the backed up versions. The date of a particular backup can be selected, and the system rolled back to the state it was in on that date. You can also choose to back up only part of the system, but APC found this to be rather poorly catered for in the software. For example, there's no easy way to back up vital system or registry files manually.

Although it works well in simple environments, anything complicated, such as a non-Windows operating systems, just won't work with the AutoBackup.

Josh Mehlman

Pros

Idiot-proof
Easy administration

Cons

No good for complex environments
Inflexible

Distributor Hewlett-Packard

Phone (03) 9272 2895

Online www.hp.com.au

Price PC25 \$7,599; PC100 \$16,899 (estimate)

Portable, cordless, small and smaller. From \$399.^{RRP}

WONDERFUL IDEAS FROM CANON for people needing a portable printer. Choices in size, weight and performance enhancement.

BJC™-85. Super powerful portable printer, international adaptor standard.

It fits easily into a briefcase, but offers desktop quality and flexibility. An international power adaptor is standard and a sheet feeder is built-in. IrDA 1.1 plus parallel and USB interfaces for printing from Windows, Windows CE and Mac are standard. Gold standard photographic printing via PhotoRealism™ and a long-life NiMH battery kit are available as options².

Totally cordless operation. Battery packs¹ and built-in infrared (IrDA) interface work with suitably equipped notebooks or PC's to print without needing interface or power cables.



BJC™-50. Ultra small, ultra light, built-in Li-ion battery.

Weighing only 900 grams, the BJC-50 is approximately the size and weight of the BJC-85. Using the included battery and IrDA interface it is capable of cordless communications out of the box, and offers a host of performance enhancements similar to the BJC-85.²

BJC-50
Just \$649^{RRP}

BJC-85
Just \$399^{RRP}

Exceptional colour reproduction, automatically.

Using standard inks optimised for plain paper, both printers automatically print high quality images using special functions included in the printer control software. Drop Modulation Technology™ uses variable ink drop sizes to smooth colour and tonal gradations.

Photo Optimiser adjusts for defects in exposure, highlights and shadows and prints accordingly.



High quality colour, high speed black and white.

A four colour print head with resolution up to 720 x 360 dpi comes as standard. Both printers accept an optional dedicated black ink cartridge with 128 print nozzles for print speeds up to 5 ppm³.

Optional colour scanner cartridge for images, fax and OCR.⁴



Image Optimiser can "correct" low-resolution Internet images up to the printer's maximum resolution. You can print banners up to 6 A4 pages long, envelopes and overhead transparencies.

Variable ink-drop sizes.

High speed black.

Four-colour print head.



Canon Customer Care.

The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.



Canon

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Gambling, porn, blasphemy...

Fair game

The Federal Government's expenditure of millions of dollars of taxpayers' money in an attempt to ban porn from the Net in Australia was and is an exercise in futility.

Your article (Burning the Censors, APC July, page 83) illustrated this fact perfectly. The vast majority of Australians will not cop this Deep South US-style enforcement of morality. The fact that banned sites can reappear in a matter of hours on an offshore server is irrefutable evidence that the Internet is beyond the control of any one jurisdiction.

The government, despite expert advice to the contrary (the CSIRO for one), still believes it can ban Internet gaming. I accept that a significant number of Australians are concerned about the effects of gambling on our society. However, the government will not reduce the impact this pastime has on our community by simply banning it.

As is evident from your research, people wanting to view porn simply go offshore, much the same as gamblers denied access to Australian-based Internet gambling sites would.

Sensible regulation is the only way to reduce the impact of gambling and porn.

The government's proposed moratorium and ban (neither of which are yet in effect, contrary to reports in mainstream media) have the potential to do great

harm to Australia's efforts to become an integral part of the global economy.

Independent experts from a wide range of IT and commerce backgrounds have warned that government interference in the provision of ecommerce services has the potential to hamper Australia's ability to meld with the international markets we need for continuing economic growth.

Some might argue that Internet gaming is a blight on society. The fact remains that it has the potential to generate huge amounts of income and flow-on benefits through taxation and licence fees, which will benefit the whole community. There are also benefits in terms of software and infrastructure development.

The Internet is constantly evolving and no single government has the right to interfere in that evolution. To do so puts at peril our development as a modern, forward-looking, intelligent community. John Howard and his 'relaxed and comfortable' Menzian cohorts should realise that Australians are smart enough to accept the responsibility for their own moral development without the imposition of unworkable, ill-conceived and expensive bans and limitations on what we hear, read, view or spend our money on.

Mike Gard

Senior Advisor

Office of the Deputy Premier

Tranmere, Tasmania

We welcome comments and suggestions. Send correspondence to **APC Readers' Say**, PO Box 37, Sydney NSW 1028, or email apc@acptech.net. Letters can also be submitted online at: apcmag.com. All correspondence becomes the property of APC and is subject to editing.

Ed note: We've left in Mr Gard's title for obvious reasons. A Labor government is currently in power in Tasmania.

Everybody's a critic

I was leafing through "IT came from cyberspace..." (APC July, page 200) and was enjoying it, with movies like *Electric Dreams* and *The Lawnmower Man* getting the pasting they deserve.

But then I saw *War Games* and *Tron* on the list. That's blasphemy! These movies are classics, man! Just because they're using a Vic 20 to hack in to government departments doesn't mean anything.



Also, in response to "Messaging Evangelism" by Roger Chambers (APC July, page 51), I have often seen Microsoft get a deserved hiding from APC both for its overly aggressive marketing and its inability to produce a stable OS. Read on sir!

Matthew Vermeulen

Western Australia

Ed note: I'm rather fond of *Electric Dreams* myself. Of course, as is clear from both the articles and reader letters published by APC in the last few months, neither we nor our reader's can be considered paragons of good taste.

Secret men's business

Having read through to the last pages of APC August, I was surprised to see that Ralph has a Web site. After seeing the write-up I thought the review was a bit rough — until I saw that a female did the write-up.

If I was asked to do a write up on *Girlfriend* or *Marie Claire*, I would begin from

Want to win a copy of Microsoft Office 2000 Premium?

The most interesting letter sent in during the month of October will win its writer a free copy of the world's most popular office suite, along with copies of Visio 2000 Professional and Project 2000. The total value of these packages is \$3,102.

The winner of this fantastic prize will be published in the December issue of APC.



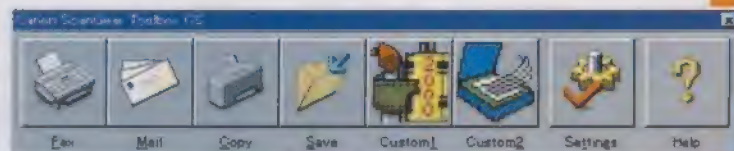
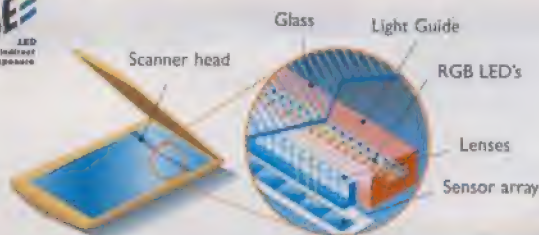
It's not just a scanner, it's a Canon for only \$139.^{RRP}

SLEEK, SIMPLE TO USE scanners with patented LIDE Technology, pass-through parallel connection and full software suite.

Introducing LIDE.TM

LIDE (LED Indirect Exposure) fundamentally changes the way scanners work, and their price/performance ratio. LIDE eliminates the need for costly, complex optical mirrors, while it maintains image quality and colour clarity in two super slim, sleek scanners.

The CanoScan N340P (300 x 600 optical dpi) and CanoScan N640P (600 x 1200 optical dpi).



Easy to use.

The ScanGear Toolbox (pictured above) lets you select functions and the final destination of your scan such as printer, e-mail program, fax, copy or others,¹ and automatically makes settings for you.



LIDE technology allows a smaller, sleeker design.

300 x 600 dpi

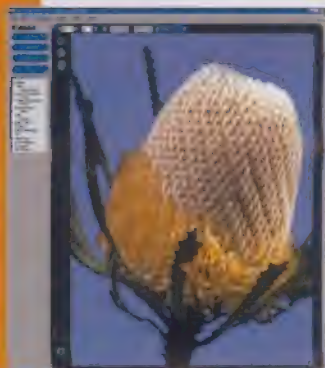
CanoScan N 340P
Just \$139^{RRP}

Getting started is remarkably easy.

Your scanner plugs directly into the parallel port, or hooks up as the middle link between a printer and your PC. Quick-and-easy CanoScanTM Setup installs the included software, and you're ready to make your first scan with Windows 95/98/2000/NT 4.0.

Full software suite, 42-bit colour input.

The CanoCraft CS-P software works for both stand-alone image acquisition, and as a TWAIN driver for other applications. Advanced controls for colour matching and image definition allows various pre-scan settings such as selecting the scan area and adjusting resolution up to 9600 dpi² with up to 42-bit colour input. The software package also includes ArcSoft PhotoStudio 2000 for photo-editing and Caere OmniPage Pro for converting scanned documents into editable text data, plus a CD ROM with user's manual.



CanoCraft makes high quality colour easy.

42
bit input

600 x 1200 dpi

CanoScan N 640P
Just \$189^{RRP}

Canon Customer Care.

The one-year warranty is upgradeable to three years for a minimal charge, and is backed by Customer Care hot-line support. For more information call 1800 021 167.



Canon

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behind the starting block because I'm a bloke, and sometimes I just don't get why girls like some magazines (and I know the two I've chosen may not be the best of examples).

The point I'm making is that *Ralph* is a bit of a laugh; it has a bit of flesh and a good review or two on wheels. I wouldn't buy it every month, but it certainly relieves the boredom of plane flights and so forth (especially if *Reader's Digest*, *BRW* and *Women's Weekly* are the only alternatives on offer!).

Lets get it right, eh?

Name withheld
Internet

Ed note: Fair enough. Next time we review a 'chick site', we'll be sure to find the blokiest guy in the office to do it. Just to be balanced.

Dropping your browsers

I'm rather disappointed with the lack of Linux programs in *APC's* August edition cover CDs.

For instance, your section on HTML editors only had Windows programs. The big disappointment was that in the browser section, only Mac and Windows were supported. There is a Netscape for Linux!

Along with a lot of other Linux users, I am dedicated to this operating system. I only use Linux; I don't do Windows or Mac. This is my choice.

Patrick
Internet

Ed note: We can't make everybody happy all the time (although we try). One month we run a full Linux distribution on the cover CD (drawing howls of protest from Windows-only users), the next we get complaints that there's not enough Linux stuff. We try to balance the OSes, giving each their due — although Linux

does frequently get more software than its market share warrants. That said, please keep sending us your feedback about what you want on the cover CDs.

Pinging in the rain

I am writing to make the public aware of a growing problem with the Telstra BigPond cable network. I have been with the service for approximately three months and have had, in total, four days of disconnection. This is not the main problem, though. The main problem is that Telstra does not seem to have a network infrastructure that can handle the amount of customers it is signing up. From 9am to 6pm every day, the ping times to bigpond.com (the host ISP) are as low as 20 milliseconds (ms). Come 6.30pm, when everyone gets home from work and starts using the network, the pings blow out to an average of 450ms! After speaking with Telstra at least five times over the last three weeks, and sending its customer support group constant traceroute information, they say nothing will be done about the situation for at least another month.

This isn't the worst part. After speaking to some friends who have Optus cable in Brisbane and whose peak hour ping times are usually 60ms or below, I contacted Telstra and tried to organise the cancellation of my cable service. I was horrified to find out that to cancel the contract, they were asking \$380! Now this would be fair enough if the service was living up to the promises, but since I can get better ping times and (often) transfer rates on a modem, I can't see where they are coming from.

It is not just me, either. I have been contacting other Brisbane Telstra customers to

discuss the issue, and they all have the same problem. No ping times under 400ms from 6pm onwards. I am at a loss as we have complained and sent all the relevant information to Telstra with no action from the company to rectify the situation.

It seems that Telstra has become greedy and signed up too many users, without analysing whether it has the capacity to sustain such an increase in customers. Optus is uncapped and gets pings of 60ms or below; Telstra is capped and gets a ping of 400ms or above . . . go figure.

Anonymous
Internet

Ed note: By far the most feedback we get — apart from complaints about the glue on the cover CD — is about broadband (followed closely by Free ISPs, see below). We plan to bring you a comprehensive roundup of broadband services next month. Stay tuned.

Hacked off

A couple of weeks ago, I had cable modem installed and so far I am thoroughly impressed with its performance. However, there is one downside: security. I've had to install a firewall, as my home computer was being hacked without my realising it. The hard drive used to start up for no reason, and for a while I thought it was normal. However, a friend who also has cable modem and had a firewall installed informed me that he received five hack attempts in one night. I took his advice seriously and installed McAfee's firewall — now the hard drive is always quiet. I'm now waiting patiently to catch the phantom hacker and report him or her to my ISP.

Name withheld
Internet



This Panasonic digital LCD monitor may be slim, but its 19" viewable screen is one of the biggest available.

Yet the LC90S's tiny footprint (it's only a fraction the depth of a 21" CRT monitor) means you can have all the advantages of a big screen on a small desk.

You get built-in bass reflex speakers, a 6 port USB hub, dual VGA inputs, superior image clarity and resolution, and a viewing angle of 160° (the best in the industry).

And you get a choice. The LC90S is part of a wide range, and Panasonic make award-winning CRT's too.

Panasonic
Customer Care Centre: 13 2000 • website: www.panasonic.com.au

Plug and play USB, push button simplicity 600 x 1200 dpi, just \$229.^{RRP}

THE MOST COMPACT flatbed scanner on the market, 600 x 1200 dpi, 42-bit colour input and push button simplicity.

Push button simplicity, unconventionally silent.

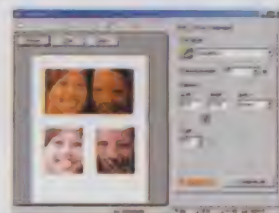
A one touch scan button activates ScanGear Toolbox CS (the scanner control software).



It lets you select functions and the final destination of your scan such as colour printout, e-mail program, fax, copy or others,¹ and makes the necessary settings for you.

Edit and store photos easily.

ArcSoft PhotoStudio 2000 is an easy to use image editor, and ArcSoft PhotoBase



creates photo databases. Adobe Acrobat Reader and PDF manuals for Windows and Mac are included.

High powered scanning with LIDE.

Patented LIDE™ technology delivers optical resolution up to 600 x 1200 dpi with 42-bit colour input. ScanGear CS offers direct scanner control and is a universal TWAIN driver for other applications.



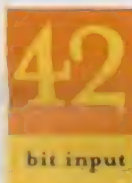
It lets you make pre-scan settings such as selecting the scan area and adjusting resolution up to 9600 dpi.²

Plug 'n play USB for Windows and Mac.

The USB interface is compatible with Windows 98/2000 and Mac OS 8.5 or higher.³ It lets you plug in or disconnect your scanner without having to turn off your computer first. And, because the scanner is powered directly through the USB cable,



it does not need a separate AC cable.



"Z-lid", advanced OCR.

This special lid simplifies book scanning and OCR with the bundled Caere OmniPage Pro⁴ converting scanned text into editable data.



CanoScan™ N650U
Just \$229^{RRP}

Canon Customer Care. The one-year warranty is upgradeable to three years for a minimal charge, and is backed by



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The 'deep Web' is hiding information resources we can only dream about.



Angus Kidman

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Bright planet, dim solution

Anyone who has been using the Web for longer than, say, Senator Richard Alston, is no doubt aware of the fundamental problem with search engines: they're not very good and they miss a lot of stuff. In a Two Bits column earlier this year (see APC May, page 56), I discussed a method for ensuring that search engines don't fill up with dead links. This month, I've been reading a white paper on a related topic: how much information is hidden away from search engines because it's buried in databases that the search engines don't know how to index.

The paper in question, 'The Deep Web: Surfacing Hidden Value' doesn't exactly come with impeccable academic credentials. The real purpose of the paper is to promote a new search service called CompletePlanet, from a company known as BrightPlanet.com. However, despite the commercial motive, the paper does address a question of perennial interest: just how comprehensive are search engines?

We've always suspected that the range of most major search engines is becoming increasingly patchy, but BrightPlanet.com's assessment is particularly pessimistic. The company draws a distinction between the 'surface Web' — essentially, static HTML pages easily indexed by conventional robot techniques — and the 'deep Web', which is information stored in dynamic, database-driven sites that often get skipped entirely by such engines, even though they're generally larger and have better quality information. According to the study, the deep Web is at least 400 times larger than the surface Web — possibly as much as 550 times larger. So, what is the total size of the deep Web? Around 7,500 terabytes.

BrightPlanet.com calculates this figure by selecting a group of representative deep Web sites, estimating their total size and number of documents, checking how well they are indexed, and then extrapolating those figures to apply across the Web as a whole. (Only one Australian site, the venerable legal index AustLII, makes the sample list.) This might not be a water-

tight technique, but as the researchers point out, it's more likely to underestimate the scope of the deep Web than to overstate it.

The problem is clear, but the solution is not quite so obvious. BrightPlanet.com's CompletePlanet service forwards queries both to multiple search engines and directly to relevant database engines. This is a useful improvement on existing meta-search sites, but I don't think it's a complete solution.

After all, even CompletePlanet can't search a database it doesn't know exists, and new databases are springing up all the time. Nor can CompletePlanet verify that the information returned is accurate or even useful.

It's probably unrealistic to assume that a single tool will ever be able to search all the resources of the online world, any more than we would assume that a person walking into a library would be able to find any piece of information they want simply by waving a magic wand at the shelves. There's no real alternative to practice, a good sense of what kind of information is available and the skill to assess the value of the data that's returned. Software can help automate the search process, but it's no substitute for inside knowledge — or help from a friendly librarian. ☐

The deep Web is at least 400 times larger than the surface Web — possibly as much as 550 times larger. The total size of the deep Web? Around 7,500 terabytes.

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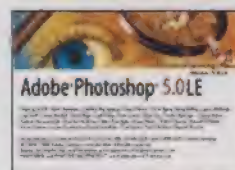
Canon's patented LIDE™ was a flatbed scanning breakthrough that changed the price/performance ratio while maintaining image quality and colour clarity. The CanoScan™ N 1220U, with 1200 x 2400 optical dpi and 42-bit colour input, demonstrates the evolution of this technology, delivering "semi professional" quality in a super slim, super sexy looking case.



Simple, professional quality software.

The one-touch scan button activates ScanGear Toolbox CS to select functions and the destination of your scan such as colour print out, e-mail program, fax, copy or others,¹ and makes the necessary settings for you. ScanGear CS offers direct control for pre-scan settings such as selecting the scan area and adjusting resolution up to 9600dpi.²

It is also a universal TWAIN driver for applications such as the bundled Adobe Photoshop LE, a limited edition of the world's most popular image editor.



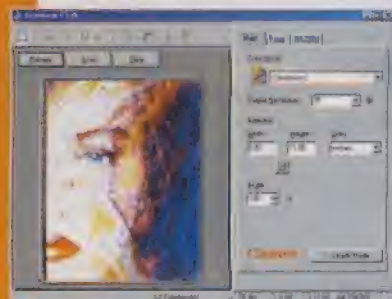
CanoScan N 1220U

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ArcSoft PhotoBase creates electronic photo albums. Arc Soft PhotoStudio allows easy image editing.

Plug 'n play USB for Windows and Mac.

The USB interface lets you plug in or disconnect your scanner at any time without having to turn off your computer first.³ And, because it is powered through the USB cable, the scanner does not require an AC cable.



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Jeremy Horey

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Have Microsoft's enemies done the company a big favour?

Software and politics

The open source movement portrays itself as a beacon of enlightened self-interest in an otherwise murky world of furious competition, where the stakes are billions of dollars in profits. Consumers are important as the source of those billions, but otherwise they're not valued very highly.

Software companies are about making money. They aim to turn their founders' good ideas into dollars to line the founders' pockets. There is nothing wrong with this. It's capitalism, and we live in a capitalist society.

It is important to see the Microsoft antitrust case in this context. Some people have tried to put a moral spin on this issue. To one side, Microsoft is an evil empire that should be humbled. To the other, Microsoft just wants to make great software and is being persecuted by its competitors who have turned the US Government against it.

The truth is that this is a business issue. Microsoft is an aggressive player that has made a lot of enemies in its rise to dominance in the software industry, but Microsoft's competitors are pretty big and muscular players themselves. Sun, AOL and Oracle are not small companies struggling on the edge of the industry.

In part, the misinformation that surrounds the Microsoft debate has come from the players themselves. They have set up their own lobby groups and front organisations with names like the Association for Competitive Technology and the Project to Promote Competition and Innovation in the Digital Age. Both sides claim to be fighting for the good of the industry.

Like all big corporations, they are using whatever tools come to hand to achieve their business goals. The good of the industry runs a distant second to the good of their own companies (and, of course, the directors' and managers' share options).

The anti-Microsoft group were able to exploit a weakness: Microsoft had not bothered to build up support in the US Government. When the anti-Microsoft group saw an opportunity to use the anti-trust law against Microsoft, they pushed as hard as they could and there was no resistance.

Microsoft has spent a lot of money to slow down the court case and, at the same time, has made an effort to build support in Washington, especially by getting involved with the Bush presidential campaign. Plainly, Microsoft thinks it will get a better deal from a Republican president than from a Democrat. If Microsoft survives, it won't be caught without support in Washington again. Next time, it will be prepared.

Whatever the outcome of the antitrust case, it is diverting management attention away from the main game and making Microsoft more cautious in its dealings.

Another factor is Microsoft's inability to beat Unix in the large-scale application area. Microsoft has always offered cheaper prices on commodity hardware, but Linux is an even cheaper competitor.

I am not suggesting that Microsoft is in decline; merely that perhaps the company has gone as far as it can go.

Ironically, a breakup could be just the thing to give each of the smaller Microsofts the opportunity to become as large as its parent. ■

To one side,
Microsoft is an evil
empire that should be
humbled. To the other,
Microsoft just wants to
make great software
and is being perse-
cuted by a bunch of
competitors who have
turned the US Gov-
ernment against it.

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1200 x 1200 dpi plus high quality photo
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Push for photo scanning



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ArcSoft PhotoStudio 2000 provides tools for editing photos, and ArcSoft PhotoBase creates an electronic photo database. Also included are Caere OmniPage Pro for OCR³ (optical character recognition), plus Adobe Acrobat Reader and PDF manuals for Windows and Mac.

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Sebastian Chan

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Where have all the innovative games gone?

Game brain drain

A quick look at the shelves of video games at a big retail store reveals that something is lacking. Not titles — there are plenty of those — but innovation. For every classic 3D shooter, there are a hundred clones, and for every classic real time strategy title, there are at least three hundred imitations. Worse still, the classics in each genre are already a few years old.

The rise of consoles like PlayStation, Nintendo 64 and now Dreamcast has changed the computer game market irrevocably. Consoles provide a bigger market than home computers, but it's a less discerning market. Consoles also have standard hardware specifications. Developers don't have to worry that 85% of their potential gamers won't have the latest 3D graphics chipset or fastest processor or 3D soundcard, and they don't have to make

adjustments to cater for different systems.

The generic beige box computer system is still likely to have one of the worst 3D cards on the market — an ATI or an onboard Intel chipset — and you can forget about laptops. In contrast, every PlayStation is the same, every Dreamcast is the same and every Nintendo 64 is the same. They are specialised machines with well-documented capabilities, limitations and programming guides.

I remember the golden age of the Commodore 64, when every month for several years hundreds of new titles were released. A large proportion were clones, but the huge volume of releases made for some truly groundbreaking titles: the robot-swapping *Paradroid*; Jeff Minter's psychedelic *Mutant Camels* games; the *Little Computer People*; and the multiplayer trading title *MULE*. The Commodore 64's standardised hardware and its omnipresence ensured its dominance over the home

gaming market for a long time. As developers were forced to work within the tight limitations of 64K of memory, they squeezed every last drop of performance out of the machine.

In contrast, the new breakthroughs in game design in the last five years have been driven by the proliferation of new hardware, and have in turn contributed to it. It was 3dfx's Voodoo1 card and the early Pentiums that allowed for the step up from *Doom* to *Quake*. Higher speed home Internet connections made the large number of multiplayer titles and online gaming communities possible.

But the differences between one 3D shooter and the next are limited to the complexity of the maze, the graphical representation of that maze, the beasts that inhabit it, and the available armoury for despatching those beasts.

Atmosphere and multiplayer options have helped make a few 3D shooter titles — such as *Half-Life* and *Unreal Tournament* — memorable, but the rest have been simple reworkings of a tired theme. Similarly, EA Sports continues to churn out new versions of old sporting titles each year, apparently trying to get closer and closer to 'the real thing'. How many FIFA soccer games are enough?

New hardware developments promise the earth: better, 'more realistic' graphics at higher frame rates, super intelligent AI, and more multiplayer connections than you have friends. At the same time, we move further and further from a platform for which programmers can reasonably expect to make games. I'd much rather swap 'reality' in games for a bit of innovation and exciting, imaginative gameplay. And I don't want to be forced into the 10-minute gaming cycle of consoles. ■

EA Sports continues to churn out new versions of old sporting titles each year, trying to get closer and closer to 'the real thing'.

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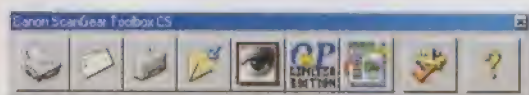
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High-speed Galileo Lens, advanced CCD, more optically accurate.

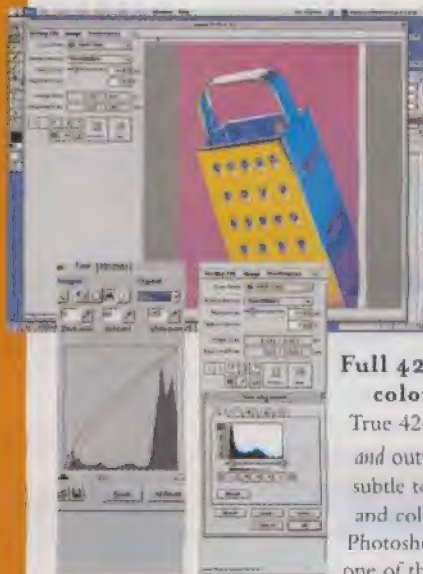
Superior performance begins with Canon's optical expertise. The five-element, aspherical lens system eliminates distortion. A shortened optical path and wide aperture lens (f-stop=5.5) increase scanning speed and improve signal to noise for a more optically accurate system. A true 1200 dpi CCD sensor is capable of finer detail and more accurate colour than "hit or miss" interleaved CCD approaches used by some competitors.



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So advanced, so simple.

The easy to use unit delivers studio quality 1200 x 2400 dpi optical resolution for almost the same price as many 600 dpi scanners. The USB interface connects to Windows 98/2000 and Mac OS systems.¹



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True 42-bit input and output increases subtle tonal variation and colour accuracy. Photoshop 5.0LE, one of the few

applications capable of handling 42-bit colour, is included. Advanced controls cover gamma settings, histogram adjustment, colour curves and more.

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bit input/
output



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Galileo Lens – Light converges at
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The optional film-scanning unit replaces the standard cover for reflective and film scanning, and matches or exceeds the performance of expensive moving light source designs. The light source in the cover uses dual sheets of 3M™ BEF film (Brightness Enhancement Film) plus dual, high-intensity cold cathode fluorescent lamps for maximum brightness. It accepts colour negatives and positives in 35 mm, 2 1/2" and 5 x 4" sizes.

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ScanGear control software, a universal TWAIN driver and Photoshop LE are included for Windows and Mac. Caere OmniPage LE for OCR is included for Windows. Caere PageKeeper for Windows and Caere ImageAXS for Macintosh create and access visual data bases.



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Flat-panel monitors have bucked the industry trend and stayed expensive. Are they worth the money?

A bit steep

Despite having been on the market for a long time, flat-panel desktop monitors are still relatively expensive. This isn't because the market sees them as boutique luxury items (and hence, is prepared to pay the price), but because manufacturers are reluctant to supply them in high volume.

The TFT (thin-film transistor) screens that make these ultra-slim monitors possible are very expensive because their manufacturing process has an inherently high failure rate. This increases sharply with screen size, which accounts for the enormous price difference between 15 and 18in TFT monitors. Manufacturers consider it risky to drop the price to find out whether consumers will buy an acceptable quantity of them — especially given the CRT (cathode ray tube) monitor's market dominance and price advantage.

For now, manufacturers are content to leave the mass market untapped as the demand from the existing small market is strong enough to support their current pricing policy. This market mainly consists of people who work in environments where desktop space is at a premium, require multiple monitors or have neighbouring equipment that is sensitive to EMF emission levels.

Manufacturers may look more seri-

ously at higher volume production after the Video Electronics Standards Association (VESA) settles on a standard digital video interface. Currently, the majority of video cards used in PCs must convert digital video signals into analog signals before they can be transmitted to a standard CRT monitor. However, when a flat-panel monitor is connected to a standard video card, it requires a digital signal. The analog signal needs to be converted back to digital, and this conversion process is detrimental to picture quality (pixel jitter and colour loss result). Unfortunately, the inability to settle on a standard makes video cards that have both a digital and analog interface rare.

This isn't a huge problem for consumers, as nearly all of

the flat-panel monitors on the market have both digital and analog inputs, but it is slowing the technology's development. It's worth pausing to consider whether a flat-panel monitor is right for you. Flat-panel monitors generally aren't capable of the colour and contrast produced by CRT monitors,

and for the price you'd pay for a 15in unit, you can get a very slick CRT unit of virtually any size. TFT screens also have

higher pixel latency than CRT monitors. This means that detailed video images

About Price Watch

Each month, Price Watch examines variations in retail pricing and service. Investigations are conducted anonymously, either by telephone contact with retailers or through pricing details supplied on their Web sites. Prices and specifications provided here are as quoted by retailers; while we assume these are correct, we cannot accept responsibility for errors or omissions.

generated at high frame rates — such as those produced by some games — can take on a strobed (or ghostly) look as pixel changes lag behind the motion.

If we haven't dissuaded you from buying a flat-panel monitor, here are a few buying tips to prepare you for a trip to the showroom. Make sure that your monitor is capable of a wide viewing angle — at least 120° — as this will save you from a lot of eye and neck strain. When you're quoted a monitor size (it will probably be in inches) make sure that the dealer is quoting the visible area of the screen, not just the dimensions of the casing.

Unfortunately, many of the retailers APC spoke to were unable to produce this information readily. If you find this is the case, note the model number of the monitor you're interested in and visit its manufacturer's Web site before you buy.



Retailer	Contact	Model	Size	Price
Forté	1300 368 923 www.fortecomputers.com.au	ViewSonic VE150	15in	\$1,875.00
		ViewSonic VP180	18in	\$6,207.00
		Mitsubishi DV150	15in	\$1,950.00
		Mitsubishi RDT180S	18in	\$5,386.00
Harris Technology	1300 13 9999 www.ht.com.au	Philips 150P	15.1in	\$1,983.30
		LG 570LS	15.1in	\$1,839.00
		Sony SDMNS0 (Ultra slim)	15in	\$2,916.00
		Sony CPD-L181	18in	\$5,915.00
		Philips 181AX	18.1in	\$6,175.40
		LG 880LS	18.1in	\$6,701.20
MicroStructure	(02) 9790 4109 www.microstructure.com.au	Mitsubishi DV150	15in	\$1,977.00

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Send & receive colour fax to colour fax without needing a PC.

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Includes Telstra FaxStream® Duet compatibility to allow a separate fax and phone number on the same line. Answering machine interface. Automatic redial, 12 one touch, 100 coded speed dials. Auto switching for phone, fax, answering machine modes.

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You don't need a PC for single sheet colour copies. As a sheet-fed B&W copier it prints up to 99 black & white copies of a single page in copy mode.

High quality, plain paper fax.

Incoming faxes are printed on inexpensive, plain paper. Ink saver mode offers better economy, and in fax mode even detects that ink has run out, and saves the document in memory. A technology called UHQ™ smoothes the jagged edges common to many faxes. With plain paper your faxes can even be stored for legal documentation without needing to make a copy.

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Fast black & white faxes in as little as 6 seconds.*



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Colour scanner for your PC
(up to 600 dpi enhanced).

WITH A PC.

Connect to a PC for colour scanning, printer functionality and the MultiPASS Suite. The fully featured Windows desktop manager allows you to send and receive faxes, store them for later viewing or printing. Scanned images can be stored as thumb-nails for easy access and viewing.



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Your Letters

Write to Your Letters and tell us about your

shopping experiences. Whether you want to vent frustration or relate a positive encounter, this is your opportunity to share it with other APC readers. The contact details are on the opposite page.

If your complaint letter is published, let us know how your complaint progresses. We'll publish updates on as many of these letters as possible.



Dear APC,

You may be able to assist me with my problem.

Recently I purchased a computer through uBid. They sent me a monitor by the delivery date but the actual computer is still nowhere to be seen. Three weeks later, I am still waiting.

I have been calling uBid on a very regular basis and have spoken to several different people at uBid customer service. They all say that they will get back to me within an hour or two. So far I am waiting for eight or so people to call me back.

They have charged me for the computer but I don't believe they have kept their end of the bargain.

Donald Too
Internet



Dear APC,

After reading the two articles regarding Netcomm's definition of an upgrade (see *APC* June 2000, page 62 and November 1999, page 54), I thought I'd share my case of 33.6-trade-in-itis with you. As in Antony Platt's case, the upgrade offer info mentioned nothing about returning my existing modem, so I was a little miffed!

It's interesting that the upgrade price quoted to Antony in 1999 is the same as mine in 1998, yet "the original upgrade offer was so old that current customer care staff were not aware of it".

I ended up buying a brand new 56K Roadster from a major chain, and I paid nearly \$50 less than Netcomm's recommended retail price, so at least I came out ahead — I think . . .

I would also like to say that I have been very happy with the performance

You lost my computer?

At *Australian Personal Computer*, we have heard many tales of PC problems, but this month's story outdoes them all: a large PC manufacturer which lost a notebook bought in by a customer for repair.

Dear APC,

I am writing to warn other APC readers about the bad service I received from Gateway.

As a subscriber to *APC* magazine, my business uses the information *APC* provides regarding the service and reliability of businesses and products to make decisions on what to purchase. We feel that our dealings with Gateway did not reflect its good reputation. This may have occurred because there is no face-to-face contact, and therefore no-one takes responsibility for solving the problem. It is important that others are aware that just because you are dealing with a large company it does not guarantee good service or reliability.

We sent our Gateway notebook in for repair under warranty in March and were told it would take four to five days to have it repaired. We were informed that the problem was a loose CPU which had been repaired and the notebook would be returned to us within the next four days.

When this date passed, I called Gateway to find out why our notebook had not been returned. A representative told us the notebook had not been sent but that it would be, and that we would receive it the following day.

We were told this another four times over the next week — but no sign of the notebook. No-one from Gateway returned our phone calls.

Finally, I demanded to speak with a manager who told me Gateway could not locate our laptop. I was told a replacement would be ordered if it could not be found.

Gateway rang to say a replacement laptop had been ordered, but the representative was unable to supply specifications other than to say it would be similar to our original notebook but would have slight differences.

The notebook was ordered and arrived with the incorrect operating system (Windows 98 instead of Windows NT Workstation), no Xircom net-

work/modem manual or drivers, old Gateway restoration/drivers CD and a TFT screen with numerous dead pixels.

I called to speak to the manager regarding problems with the new laptop and was told he was not available, so I left a message on his voicemail. My call was not returned.

I also spoke to Gateway's technical support regarding the dead pixels. I spoke to Tony, who was very helpful. He arranged the delivery of a new unit, updated restoration/drivers CD, Xircom manual and a consignment note to return the other laptop. He offered to help install software over the phone if necessary.

I then received an invoice for \$4,198 for the notebook. I rang Gateway and was told to ignore this invoice.

The new notebook arrived at the end of April. I had to call Gateway, as no return consignment note was included (to send back the first notebook). This eventually arrived and I was able to return the old notebook.

The main issue that concerns us is that Gateway lost our notebook and that it took them two weeks to realise this. Other concerns we have are that Gateway staff did not follow through with promises they'd made; that a large number of follow-up calls were required by us to solve each problem; that the customer relations manager rarely returned our calls; the length of time spent in the phone queues and on the calls; discrepancies between the time items were said to be sent out and actual postage date on the item; customer relations not being at all sympathetic to the situation; and the time we wasted, unable to leave the office, waiting for the delivery.

This episode caused us a lot of stress and put us under unnecessary pressure.

Danny Celhar
Platypus Systems

APC last published a complaint letter about Gateway back in February 1998 regarding the extremely late delivery of a PC. Gateway's managing director at the time, Peter Lees, apologised for the lengthy stuff-up and told APC the company was working on delivering "improved communications" in the future.

When you drop your machine in for repair, the last thing you expect is that the company will lose it. By Roulla Yiacoumi

Illustration by: Melissa Letts



Since then, Gateway has had a change in management. APC forwarded the above complaint letter to new Gateway managing director Paul Heath. Paul informed APC that the matter had been resolved, that he wanted to "move on" and that he saw no reason why the letter should be published.

At APC, we beg to differ. We consider the matter of a large PC company losing someone's machine extremely serious. Paul passed on our letter to Gateway's executive response advisor, who wrote the following:

Dear APC,
I have spoken to Danny Celhar and we have discussed the issues raised in the letter. I am pleased to advise that the process error which caused Mr Celhar's notebook to be misplaced has been corrected so as to eliminate any repeat of this situation.

We are deeply concerned by Mr Celhar's comments regarding the lack of communication and length of response time taken to resolve his issues. I have spoken to the departmental managers involved in this issue and have brought

the incidents described to their attention. We are confident that the level of service provided to any of our clients from this point will have greater efficiency and result in a higher level of client satisfaction.

Gateway appreciates Mr Celhar's efforts in taking the time to relay his concerns to us. We are very sorry that he experienced any difficulties.

As a gesture of goodwill, we have offered to replace Mr Celhar's current notebook with a newly manufactured notebook of his choice to the original purchase value. Mr Celhar has advised us of his interest in this offer and is currently viewing our Web site to make his selection. Mr Celhar has my telephone number to contact me when he is ready to proceed with his order.

In conclusion, from my telephone conversation with Mr Celhar, I understand that he now feels his issues have been addressed satisfactorily.

*Melissa Robinson
Executive Response Officer,
Gateway*

and value of all my Netcomm modems and I would recommend them to anyone.

*Ross Phillips
Internet*



Dear APC,
Within minutes of connecting to my provider (TPG Internet) I get booted off, sometimes up to five times in as many minutes.

Eventually, the connection is secure, sometimes only after the second or third connection attempt. It is frustrating and expensive, especially for a pensioner.

I checked my line with Telstra. I have a separate telephone line for the computer, and I was assured that I had a quiet line, so there's no problem there.

I have repeatedly called TPG's Perth office and asked if it could be a problem at their end, but have had no response.

*Peter Duhig
Perth*

Update

Last month, Jason Gan wrote to complain about the quality of an executive leather carry case purchased from Gateway for his notebook. Jason contacted Service & Reliability to say Gateway was sending him a refund, "so the issue is closed".

Also last month, Gordon Maxim wrote to say he ordered a NeoGeo and two games cartridges from Blade Electronics in Queensland by mail order. One of the games was missing and Gordon was unable to make contact with Blade. Gordon told Service & Reliability that he finally received the missing cartridge and that he has "no outstanding issues with Blade Electronics any more".

Have you ever dropped off your goods for repair, only to have them lost or damaged by the company? Did the company rectify the problem or instead claim no responsibility? Email us at service@acptech.net or write to Service & Reliability, APC, PO Box 4086, Sydney NSW 1028. Letters may be edited for length or clarity. We regret that not all letters can be personally answered.

THE INCREDIBLE



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Cutting Edge looks at two 20th-century developments that seemed like they might spell the end of the world.

Frankenstein's legacy

The publication of Mary Shelley's novel *Frankenstein* in 1818 highlighted a fear that is still with us today. The fear is that one day science might go too far; that our technological creations will turn on us and wipe us out. As scientific knowledge progresses, our admiration for technological change is counterbalanced by a fear of what could go wrong. For example, Bill Joy's article in *Wired* magazine, which dealt with the fear of nanotechnology gone bad (see APC September, page 84), speculated on the potential dangers of nanotechnology, asking 'what if?'. The same fear is evident in movies such as *Matrix* and *The Terminator*.

ures into a working model. From pure calculations came one of the most destructive bombs ever produced.

We are well aware of the outcome of the dropping of atomic bombs on Hiroshima and Nagasaki. However, there was another danger connected with the research at Los Alamos, one that threatened the destruction of all life on Earth.

Physicists — including Edward Teller, who later worked on the hydrogen bomb — came up with calculations that showed there was a very real possibility that detonating an atomic bomb could set off a chain reaction, igniting the Earth's flammable atmosphere. They claimed that detonating the bomb would be like walking

that accelerates heavy ions (gold atoms without their electrons) to near light speed and makes them collide so the effects can be measured. It is hoped that when the atoms smash together and fly apart they will reveal all manner of quantum effects and particles such as quark-gluons.

The threat (poorly grasped and thus overstated by the mass media) was the possibility that RHIC would create a black hole. Black holes are superdense areas of space into which all matter — including light — is drawn. As more matter falls into a black hole, it becomes more dense and its gravitational pull reaches out further. Obviously, the idea of building a machine that is capable of creating a black hole and therefore



At least two major 20th-century scientific breakthroughs have generated fear among scientists and the public, because they were thought to have the potential to destroy the world. One of the breakthroughs occurred decades ago and while it didn't result in the total destruction of the Earth, it changed our social dynamics enormously. The other occurred just months ago.

In the early 1940s, as war was raging in Europe and the Pacific, a group of young physicists and scientists gathered at Los Alamos in total secrecy to work on a project the government had been toying with. The object was to make a very large bomb. The physicists at Los Alamos worked with purely theoretical numbers and concepts; it was the army's job to transform those fig-

into a room full of pure oxygen and using a cigarette lighter: an all-encompassing explosion would occur, destroying you along with your enemy.

The effects of an atomic or hydrogen bomb detonation are devastating, but the chain reaction produced by splitting atoms is fortunately confined to a very limited area. Of course, the proliferation of nuclear weapons in the following decades meant that if there was a nuclear war, it would destroy all of us — friends and enemies alike.

A more recent example of technological research that might have caused the Earth's destruction is found in a project directed at smashing atoms. The Relativistic Heavy Ion Collider (RHIC) is a machine

eventually gobbling up the Earth had many people worried.

You'll be reassured to know that RHIC has been running for months without incident. Although they have created what could be described as 'black holes', these last only for a millisecond and have affected only the quantum particles around them.

The risks and dangers (for all of us) inherent in scientific research mean that it's essential that the public has a voice in the directions science takes. After all, Frankenstein's monster could come back to haunt all of us, not just its creators.

Darren Ellis

➔ Darren Ellis can be contacted at delis@acptech.net

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- **Lightning and surge suppression** to protect your computer and its peripheral equipment from catastrophic damage
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CAN YOU MAKE

MONEY ONLINE?

Get-rich-quick schemes have proliferated on the Net. High-speed share trading, online auctions and domain name trafficking all hold out the promise of untold wealth, in return for varied (but sometimes minimal) amounts of effort. Can the promise be realised? APC checks out the fastest ways to wealth on the Web.

It seems like every second page on the Web is trumpeting a money-making opportunity that you haven't got around to taking advantage of. Look at a portal site and you'll be assailed by advertisements for online trading services. Even if you don't want to risk your savings on the stock market, you might wonder how much money the site is making for carrying the ads. You'll soon see another ad urging you to join the millions of happy traders buying and selling at online auctions.

Go to a news site and you're likely to find a story about a domain name being sold for hundreds of thousands of dollars, or a report about the prevalence (and profitability) of pornography on the Web. Open up your mail and you've probably been spammed again with promises of thousands of dollars to be made just by surfing the Web.

April's stock market crash may have signalled the end of risky investing where massive amounts of cash is handed out to dubious enterprises with

little more than a catchy dot com name and a business plan promising zero profits. However, the dream of making money online on a smaller scale still appeals to many individuals who have a PC and some imagination.

In the following pages, APC examines six of the most popular ways for individuals to turn a dollar online: day trading, swapping banner ads, selling through online auctions, selling domain names, running porn sites and using 'paid to surf' schemes.

APC looked at the common methods of making money, scoped out the legal issues and talked to people who have tried it for real. And to really put some of the schemes to the test, our editor-in-chief, Angus Kidman, foolishly agreed to try his hand as a domain name seller, auctioneer, cybersquatter and host for online advertising, to see how much money he could make online in a week. Is there still a pot of gold at the end of the Net rainbow? Read on and find out.

Banner republic

If your Web site is attracting a lot of visitors, maybe it's time to think about advertising. Just sign a deal with a broker, put up a banner ad, and watch the money start rolling in. Or that's the theory.

Advertising is generally sold in one of two ways: advertisers pay a fee every time their ad is viewed on your site (pay per view), or every time someone clicks on a banner ad (pay per click). Some advertisers will pay for both.

Some pay-per-view advertisers demand a minimum level of traffic — at least thousands of visitors a month. Larger brokers won't even look at your site unless you're getting hundreds of thousands of page impressions a month. Pay-per-click advertisers are usually less picky about the number of visitors you get.

A third option is to join an affiliate program. This is even less direct than per-view or per-click advertising. The advertiser pays you a percentage of any sales it makes to customers who have clicked

through from your site. However, you're dependent on the advertiser's ability to sell its products, which can't always be relied on.

Online advertising scams are quite common, so APC advises you to proceed with caution, particularly if you're dealing with overseas brokers. Brokers have been known to underrepresent the number of clickthroughs or page views (while at the same time overrepresenting these

figures to the advertisers), or to impose all sorts of conditions that may result in the Web site owner never getting paid.

Pay-per-view brokers sell ads to advertisers using a figure called CPM, which is a cost per thousand page impressions. International CPM rates range anywhere from US 25 cents to \$US25, but anything over about \$US1 is exceptional or suspect. Australian brokers usually charge between 30 cents and \$1. Ad brokers will give you a percentage of the revenue made from your site, which is usually heavily weighted in the broker's favour.

Pay-per-click brokers charge a flat fee for every time a user clicks on their banner ad. Advertisers will pay anywhere between US 2 cents and US 20 cents per clickthrough.

Most affiliate programs pay 5% of their sales as commission but, depending on what they're selling, they can pay as much as 50%. Some will pay a flat fee per customer or per item sold.

Josh Mehlman



Laying it all on the line

Over a dozen Internet-based share trading services are now operating in Australia. They're part of a global trend that has single-handedly produced the most retail investors in history. Easier access to markets, and Net resources such as newsgroups, investment sites, companies' sites, and the Australian Stock Exchange (ASX) itself help the least-educated investor avoid getting sideswiped by today's unpredictable market.

The potential to lose big is why most people trade online only as a hobby, but some more daring investors are turning online share trading into an occupation of its own. There are many anecdotes about US day traders who've made millions overnight by hitting the right initial public offering, but currency fluctuations add considerable risk for Australians investing local currency in US markets.

A number of Australians have found that tenacity and caution can support quite a good career playing the ASX. One such investor is Gabbie Lipps, a marketing graduate with 15 years' experience as a marketing executive, business investor and real estate speculator. Lipps started trading



online in 1998 and now executes between four to 12 trades per day, typically worth \$10,000 to \$20,000 each, using St George Bank's Quicktrade.

For Lipps, trading has become a long-term, full-time job that gives him flexibility that is unavailable in the corporate world. A modest investment property and his wife's salary ensure that a slow market won't put them out on the street, and since trading is his main income-generating activity, online

service fees, the cost of Internet access and similar business-related charges are all tax-deductible. Even better, the profits he makes are exempt from capital gains tax, as they are classified as income instead of an investment return.

He doesn't sell everything at the end of the day in true day trader style, but Lipps maintains a regularly changing portfolio of six to eight hot prospects. He's learned that share market success requires vigilance and a cool head.

"Buying and selling shares is a very emotional thing," he said. "There are an awful lot of large players who try to scare you. You really need to keep your cool; it's not a place where you need to panic. I've made probably every mistake that you can make and hopefully I've learned from them. There are a lot of people on the Net who are losing money, and some people will wait for shares to go up 30%, 50% or 100%. But I think you have to have a lot of discipline and have to say to yourself 'I'm happy to make a limited profit'. By taking that philosophy and not being too greedy, you can make good money."

David Braue

Alphabet Soup and how to read it.

We can tell you that WAP stands for Wireless Application Protocol; ASP means Active Server Pages; PHP, XML and HTML are programming or web languages; MCSE is Microsoft Certified Systems Engineer, JSP is JavaServer Pages. Dymocks recommend the books on this page as the best way to boost your knowledge, fire up your system and get your operation running better, more efficiently and more profitably.

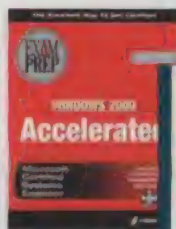
Web Application Development with PHP 4.0 - Till Gerken,



Tobias Ratshciller & Alexander Aulbach
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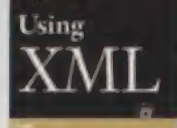
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Beginning XML - David Hunter et al
What XML is, what it can do, and how to use it in web, e-commerce or data-storage applications. **\$84.95**



Bluetooth: Connect Without Cables

Jennifer Bryer & Charles Sturman
Bluetooth is a technology for small devices and computers to communicate without cables or wires. By 2005 there will be more than 570 million Bluetooth-enabled devices, according to research by Cahners In-Stat Group. This is an introduction to Bluetooth for professionals in the computing and telecommunications industries. **\$87.95**



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Online titillations, big bucks

It has been said that the adult entertainment industry is the only one making any money online, and it's not hard to imagine why. Sex is everywhere on the Net, and many people make loads of money quenching the collective global thirst for it.

Yet competition is fierce: there are tens of thousands of sites, catering to every conceivable taste. Most offer archives of images and movies, while many more add enhancements such as live chats, interactive games and other features intended to extract membership dollars and repeat visits from customers around the world.

Starting a porn site requires far more commitment and resources than most of the other money-making schemes outlined here. You need a server with lots of storage space, a fast connection to the Internet, access to Web design and online multimedia skills, and loads of free time and money to cultivate your collection of smut. An exhibitionist streak can also be helpful if you're planning on putting pictures of yourself or your friends online.

"You do a lot of research, and basically have a look on the Net to see what's around," said 'Danny', Webmaster with Melbourne-based porn network Aussie-

SexNet, which started six years ago and now employs 25 full-time staff. The site receives over 6,000 hits a day from Australian customers, and "hundreds of thousands of hits per day" from overseas. The company now generates substantial revenue from "probably in the tens of thousands of members," but success hasn't come overnight.

"If you were entering the industry now, I would say you need multimillions, not one or two million," Danny says, "unless you're an enthusiast with only one site and this is just a standard personal type of Web site. But if you want to make serious dollars, it costs an enormous amount of money to run. A lot of people think it's an easy dollar, but it's not any more."

Like most companies, AussieSexNet is faced with the difficulty of getting — and keeping — skilled Linux and Windows NT engineers to build Web sites that can withstand intense levels of activity. There are the complexities of delivering high-quality graphics, streaming and live video to an audience that will quickly turn to a competitor if they get bored. Then there are network security and copyright infringement issues, and local and overseas legal requirements to deal with,



as well as the need to network constantly with other operators.

Operating a successful porn site can be exhausting. "You don't see daylight," he said. "You don't sleep much, and you have a different level of communication with people. You stop interacting with the outside world because you're working, talking with colleagues, and doing video hook-ups. It's very, very virtual, and you need to shake your head and go out for a drive sometimes. It is tricky, and extremely taxing, because it never shuts down, and you really have to understand [every part of] it."

David Braue

Net rich quick!

When APC began planning a feature on how to make money online, it quickly became apparent to us that it wasn't going to be good enough simply to outline the major methods involved, and find people who'd made them work (even though that did turn out to be a big part of what we did). No, in the best APC tradition, we would actually have to test some of these methods. For reasons that still aren't entirely clear, I was volunteered as the guinea pig for these tests.

My qualifications for this role were not entrepreneurial skills or any notable experience in running a business. Basically, it came down to the fact that I have no sense of shame and am willing to try anything, no matter how tacky, to make a fast buck. Also, as editor-in-chief, I was the only person with any chance of getting our notoriously stingy

finance department to agree to fund the exercise if we took a dive.

To add a little frisson to the experience, we decided I would have just a week to make money. After all, this is the new



economy, and things are supposed to happen at an entirely different pace, right? If I had a year to make some dough, I'd just use a term deposit.

The week-long deadline meant that some of the more reliable methods of

APC's editor-in-chief tries his hand at instant wealth.

making money, like pay-to-surf schemes, weren't going to be practical. The first plan that came to me was to try a little cybersquatting. I located a couple of strong-sounding domain names (one was windowsme.com.au), and even registered the local domain for a well-known computer magazine but, in the end, I got cold feet. With so many recent WIPO decisions giving domain names back to trademark holders (see "Don't brand so close to me", page 30), there was a good chance that I'd end up having to pay lots of legal fees and relinquish the domain name.

Eventually, I came up with a two-stage plan: to try auctioning off a domain name (one that was catchy, but not trademarked), and then to try running banner ads on my Web site. This would involve minimal expense and might produce a decent return. Did I succeed? Read on and find out! Angus' saga continues on page 74.

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Getting a piece of the auction

If you have a penchant for garage sales and are regarded by friends and family as something of a hoarder, the online auction could be just the outlet you've been looking for. Using these auctions to expose and offload collectibles, memorabilia and other preloved wares to a worldwide audience is proving very popular. You can clean out the garage and make a tidy sum with very little effort.

Pay a visit to the world's most popular online auction site, eBay, and you'll be met with the many success stories of those who manage to live off their eBay earnings. Some claim to earn up to \$US30,000 a month from operating small businesses through the online auction site.

The hobbyist can't really expect returns like this, but the online auction can reach a wider audience than conventional advertising such as the classifieds and the *Trading Post*.

Martin Hoffman, CEO of Sold.com.au (Australia's largest online auction site with over 130,000 registered members), is understandably excited by the success



of online auctions in Australia. "People love the fact that there is an Australian site, all in Australian dollars, with local buyers and sellers, and which has the volume of users and listings to buy and sell the things they want, when they want."

According to Hoffman, people use the online auction medium because it is a cheaper and easier way to advertise and sell; it is a "great place to do a deal" and it helps raise some extra cash. Other Australian sites include eBay.com.au and bidorbuy.com.au, and each works on much the same principle.

Charlene Morris has been using Sold.com.au to sell her wares since January. A sales manager by day, Charlene sells goods at online auctions to supplement her income, but admits that her earnings from auction sales are modest at best. "You can make a profit from it on a hobby basis," she said, "but I would never consider doing it full time. I wouldn't make as much as a wage. It is the challenge and the excitement of the auction that makes me do it as a hobby."

If you want to convert your clutter into cash, it seems you shouldn't give up your day job just yet. You'd be better off trawling the various auction sites to get a feel for how the process works before you start planning an early retirement.

Fiona Williams

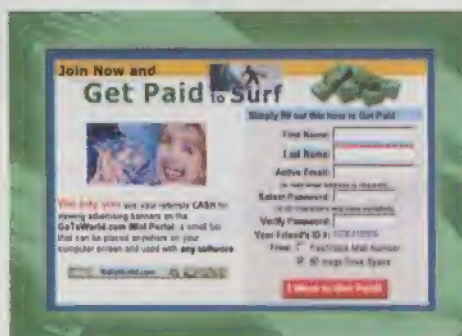
(Desktop) real estate speculators

Anywhere but on the Internet, it would be hard to find someone willing to pay you for doing absolutely nothing. However, thanks to the questionable business plans of a number of enthusiastic startups, millions of Net users around the world are now getting paid good money just to use the Internet.

AllAdvantage.com, GoToWorld.com, Paid For Surf, GetPaid4.com, Surf2Web, DesktopDollars.com, MValue.com and scads of competitors now share their only source of income — advertising revenue — with Web surfers who give up some of their Windows or Macintosh desktops for a permanent window that displays a constantly changing series of advertisements.

To make sure you're seeing the ads, the programs scan your computer for mouse movement, active clicking on Web links, or other common tasks. At the end of the month, or when your account reaches a certain amount, you get a cheque in the mail.

Heavy Net users can even make a profit through multilevel referrals, in which you make a commission for every hour spent by people you refer to the service. If they refer someone in turn, you get even more money



— often extending to five, six or seven iterations. Those with extensive referral networks can make several hundred dollars a month, and at typical rates of about 50 cents per hour, even modest levels of Net use can pay your Internet access charges.

There is a catch: most of these companies are US-based and only pay in US dollars. Local banks charge \$5 or more to convert this to Australian dollars, and at least one online company also charges a cheque-issuing fee. When you join up, find out if you can arrange to have cheques sent to you less frequently to minimise service fees.

AllAdvantage.com (au.nz.alladvantage.com) and Surf2Web.com are the only

pay-to-surf companies with Australian offices. Zonic (www.zonic.com.au) offers a similar service that pays you to read promotional emails. All three provide cheques in Australian dollars, which should put them high on anybody's list. Check www.cashgenerators.one.net.au for a list of programs.

Some unscrupulous Web surfers have rorted the system by using custom programs that simulate mouse movements or Web surfing, but many systems have ways of detecting these programs and you could be thrown off if they catch you.

'Rayvyn', a 26-year-old mother from Melbourne, said her membership with AllAdvantage.com, Spedia, Jotter and GetPaid4.com has netted enough cash over the past year for her to buy a bunkbed, second-hand DVD player and other "things we wouldn't have bought if we didn't have the extra money".

"If all the programs are working, do their proper thing and I do online what I usually do, I make \$70 to \$100 a month, and that's without any other referrals. It easily pays for my Optus @Home cable modem service."

David Braue

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Master of your own domains

What's in a name? Well, \$US7.5 million if it happens to be business.com. That's how much LA-based eCompanies paid for the highly prized domain name to house a business-to-business portal. However, this is small fry compared to the reported \$US38 million recently offered to youth-oriented entertainment site cool.com. If he accepts the offer, it'll make a tidy profit for the owner Tim Lee, who half-jokingly registered the name for the standard fee as a university student five years ago.

These are some of the extreme results produced by a phenomenon that is fast shaping up to be the mother of all get-rich-quick schemes: domain name selling. It's unbelievably easy: think of a catchy moniker, register it before someone else does, advertise it for sale (at either an online auction or specialist domain name selling site), sit back and watch the bids roll in.

Mind you, the chances of snapping up a catchy .com domain name (at an affordable price) at this late stage are not good. You may be forced to opt for a more obscure suffix. This is not necessarily a setback, as sometimes the most sought-after Web addresses can originate from

the unlikely of places. The little-known South Pacific island of Tuvalu this year leased the rights to its country code domain suffix .tv to ebusiness incubator Idealab for an amount that was more than three times the tiny nation's gross domestic product. Idealab created a startup named dotTV that is now auctioning the domain names for as little as \$US100 a pop. Obvious choices like my.tv, watson.tv and bigscreen.tv have already been snapped up, but kids.tv, music.tv, or (my personal favourite) notmuchon.tv were still open for bidding as APC went to print. Get in quick and you might find yourself sitting on a goldmine.

Another option for making money from domain names is cybersquatting, where you register the name of a popular product, company or individual and attempt to sell it to the original owner at an inflated price. However, this practice is



more likely to lead you to the courthouse than the bank, as it has been declared illegal. Julia Roberts successfully wrested juliaroberts.com from the clutches of would-be cybersquatter Russell Boyd in June, and other celebrities and the copyright holders of major brands have taken their complaints to the UN's World Intellectual Property Organisation in the hope of similar outcomes.

Fiona Williams

My life as an auctioneer

Having thought twice about my cybersquatting plan, I decided to take a different tack. As a longtime user of eBay, I'd noticed that domain names were frequently on offer, sometimes for surprisingly high amounts. All I had to do was come up with a suitably salable and creative name, advertise it, and wait for the bidding to begin. I decided to forego creativity and just dream up a useful name for a porn site. Sixty dollars and 50 cents (including GST) later, I was the proud owner of the **pornmower.com** domain. (I know, it's a terrible pun, but I didn't want anything too tasteless.)

Unlike its US counterpart, eBay Australia was still offering free basic listing when I decided to put the domain up for sale. I could have minimised my costs by using this (eBay just takes a percentage of the sale proceeds), but after weighing up my options carefully, I decided to splurge a little extra (\$11.95 to be precise) for a feature listing and a bold typeface.

Composing an appealing ad took me much longer than thinking up or

registering the domain. Eventually, it was ready to go (see the pic). The initial asking price for the domain was \$100, enough to give me a healthy profit once I'd covered my costs and given eBay its cut. I chose a five-day auction (I didn't want to look too needy), and waited.

Waiting, it turned out, was all I did. Despite heavy promotion (I was the only featured auction in the Computers: Services: Domain Names category on eBay Australia that week), I didn't attract one single bid for pornmower.com. The only consolation was that a quick surf around the category confirmed that the bottom seemed to have fallen out of the domain name market. The only sites getting any bids at all that week were fiesty.com and golfhost.com (and the latter had only attracted a \$2.50 offer, which wouldn't even cover the cost of a packet of tees).



I wasn't the only one to have failed, but I had still failed. Now I was the proud owner of a porn domain name with no money to show for it. There was only one place left to go: the very pits of cybersleaze.

AUCTIONING OFF DOMAINS

Total expenditure	\$72.45
Total income	\$0
Net profit/loss so far	\$323.95 loss

Angus' saga continues opposite.

My life as a porn banner

Everything I've read about making money by advertising on the Net has stressed that the only sure-fire winner is to run an adult site and populate it with pay-per-click banners. Each of these banners might only earn you a couple of cents, but if you get enough people through, this could quickly mount up. It also costs nothing to sign up.

To make such a scheme work, of course, you need a popular site. Fortunately, I had one. My personal home page, Gusworld, includes a section, Mighty Morphin' Dannii Minogue (in which the singer/actress turned into a globe-saving, leather-clad supervixen), which gets regular fan mail. A bunch of other sites also link to it. All I had to do was sign up to a few adult ad programs and wait for the money to roll in. Most of these schemes don't pay until you hit a \$50 threshold, but even theoretical money would be nice after two failures.

A quick search later, I had signed up with three programs: Hypercash (conventional hetero porn), Everyclick (targeting the gay market) and Adult Friend Finder (an X-rated personals service).

Signing up was quick, easy and instantaneous. Choosing the banner ads to run was a stomach-churning process but, after some deliberation, I chose examples that weren't downright offensive, just tacky.

Daily checking on eBay had quickly worn down my spirits, so for this part of the money-making program I just left the site alone to get on with it. A week later, I logged on to my real time stats sites for each program, and quickly discovered that I'd made a grand total of US 7 cents. As pathetic as this sounds, this was still my most profitable money-making attempt.

What lessons can we learn from this debacle? Even allowing for the rushed nature of the testing — the self-imposed one week deadline, the fact I didn't attempt to relist the pornmower.com domain or run the banner ads for longer — it doesn't seem like there's any sure-fire, low-effort way to make your fortune online. It looks like it's just another (rather addictive) pipe-dream. I know, what if I combined the porn ads with the handy porn domain I own?

Angus Kidman

GUSWORLD

Mighty Morphin' Dannii Minogue

By day, she is Dannii Minogue, well known TV presenter, actress, successful singer and all-round Minogue. When danger threatens, she is transformed into Mighty Morphin' Dannii Minogue, a mega super heroine with a strange fondness for tight vinyl costumes and sword fighting. And now you can read about her adventures exclusively on Gusworld.



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Total expenditure	None
Total income	US 7 cents
Net profit/loss	\$323.88 loss

Angus' continued attempts to make money online are tracked in the new Xperiment column on apcmag.com. Check it out!

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Target: Female

*Web site producers are increasingly interested in attracting a female audience. Are women's online habits any different from men's? Why are so many dedicated women's sites losing money? Are the strategies used by magazines and TV to attract women also at work on the Web? **Josh Mehlman** takes a peek.*

A new consumer ethos developed in Western culture during the post-war booms of the 1920s and 1950s, when manufacturers sought to develop markets for their mass-produced goods. Advertising in magazines, on radio and later on television, portrayed happy households living better through the consumption of goods and services. A large proportion of this advertising was aimed at the stay-at-home housewife; what better way to achieve an idyllic *Leave it to Beaver* household than with a time-saving washing machine or vacuum cleaner?

Society has moved on, but the traditional image of Dad going to work and Mum holding the purse strings and making the day-to-day decisions endures. Evidence for this is everywhere, particularly in conventional women's magazines like the

Australian Women's Weekly, which is now extending into TV and onto the Web.

The Internet's consumer society is only just starting to develop, and marketers are grappling with a new challenge: developing a mass market on the Internet. Some men are already comfortable with surfing and buying online, but women are the Net's great untapped market. How do Web sites target women? Is it back to the 1950s with babies, clothes and housework tips, or is it more complicated?

Same old, same old

Before looking at the Web's strategies for attracting women, let's consider how conventional media has targeted female audiences. A good example is APC's publisher Australian Consolidated Press, which pub-



lishes many popular women's magazines. These magazines are specifically aimed at different age groups: start them young with *Dolly*, move on to the more mature *Cleo* and *Cosmopolitan*, or *She* for the young professional, then progress to *Woman's Day* and the *Australian Women's Weekly*. All these titles are often criticised for their conservative and commercial viewpoints, yet they continue to be successful. In a relatively small and competitive market such as Australia, magazines that take even a slightly different approach, such as the ill-fated *Mynx*, rarely succeed.

Magazines can afford to aim at a particular niche (provided that niche is large enough), but television has to appeal to a much larger audience. Commercial television networks do not openly admit to targeting a female audience, or any other demographic group. When APC spoke to programming directors at major commercial networks, they claimed that because TV is a mass medium, they tend to aim at the broadest possible audience for a show. Some programs might be skewed in favour of a particular audience, such as women, but they are never aimed solely at that audience.

With this commitment to mass appeal, it's not surprising that the vast majority of television programming which is skewed towards women is also commercial and conservative.

"Where you have a mandate to be politically correct, you try to make the program meet the needs of the whole audience," Seven Network's media consultant of 30 years Dina Browne said. "I don't think one program can meet the needs of everyone." This means that most television fare is "patronising and mediocre, because you're always catering for the lowest common denominator".

A large part of the problem, Browne said, is that the majority of decision makers in the Australian television industry, with the exception of the ABC, are male. A more even gender balance in the industry would go a long way towards more balanced viewing. "If you have a philosophy that you put on programs that meet the needs of a diverse constituency of your audience, and all those decisions are in the hands of one gender, it doesn't make sense," she said.

This makes the Web a much more promising medium for women than television, according to Browne. "The Web is different because it's unregulated. Anybody can publish on the Web, even though it may just be a single, personal perspective," she said. However, this advantage is also a problem, because "unless you have a great deal of experience, it's hard to know what information is accurate or relevant and what isn't". Some Web content is free from the problems that characterise commercial television, but finding it can be very difficult. This means many Web users resort to mainstream, commercial Web sites, which are beset by the same problems as commercial TV.

Why the sudden interest?

It's well known that when the Internet started becoming popular, it was a male-centred medium. "When it was still a very new technology that only a limited number of early adopters were using, those using the Internet and buying online were mostly male," said Ekaterina Walsh, senior analyst for technographics data and analysis at Forrester Research. In its early days, it was quite an unpleasant place for women to be.

Rosie Cross started the geekgirl (www.geekgirl.com.au) Web site in 1994 because

she was fed up with the level of sexism online. "In the early days, the online scene was really dire for chicks. We got pounced on all the time, and it was really boring to be continually harassed or hit on," she said.

Recent figures show that women are rapidly catching up with men online. In the US, the ratio of men to women online reflects the gender ratio in the general population. Australian women are lagging a little behind, but the gap is closing. There is still a relatively large disparity between men and women online in Europe.

As the Internet becomes more mainstream and as more women get connected, there is an increasing interest from Web site producers in female audiences. How can Web sites get women interested? Are women's online habits different from men's, and if so, how should they be catered to?

Of course, one of the primary motives for Web site producers is financial. "I think one of the main reasons for the rush towards women is because of the current hype about ecommerce," Walsh said. "Women have been perceived as the ones who hold the purse strings and manage the finances; not in the sense of investment, but simply in terms of holding the budget and allocating the budget for the household, and they are certainly the ones that are most in charge of purchases."

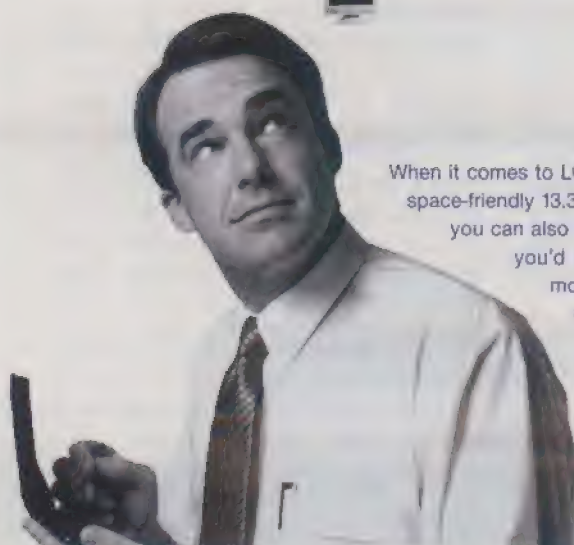
What do women do online?

Research by Nielsen//NetRatings reveals some interesting differences in the surfing habits of men and women. According to NetRatings' June 2000 figures, online greeting card sites such as Blue Mountain Arts and Egreetings.com have a predominantly female audience; 64% of Blue Mountain's audience is women aged 18 and over. Web sites connected with television shows also have strong appeal for women. Web sites for shows such as the Nine Network's *Getaway*, *A Current Affair*, *Burke's Backyard* and similar shows at the Seven Network have a strong female following. Health and family-related sites are also popular with women. Sites such as Yahoo's Store and ninemsn's shopping portal draw a primarily female audience, but other shopping sites such as dstore and Woolworths appear to be equally popular with men and women.


The areas of the Web that have a predominantly male audience focus on pornography, finance, sport and software that can be downloaded. Auction sites such as eBay, Sold.com.au and the Trading Post are more popular with men — only about a third of the visitors to these sites are women. While men are the main audience for



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online investing and financial advice sites, the Australian Tax Office's Web sites relating to the GST and the new tax system are slightly more popular with women.

Once age is taken into account, even more differences come to light. Women aged 18 to 34 are very strongly represented on job-hunting sites, search engines and especially sites related to communication applications such as Hotmail, MSN Messenger, ICQ and other messaging clients. Women aged 35 and over make up a large proportion of the audience for search engines, online banking and communications-related sites.

Age is a much more significant factor in online usage patterns than gender, according to Media Metrix chief executive David Stewart-Hunter. "If you look at the population of all adult women and ask which Web sites they visit, they end up being the same sites as adult men. There are some biases, but they're not massive," he said.

Media Metrix's May 2000 Audience Ratings Report shows vast differences in the surfing habits of women of different ages. Girls aged two to 17 favoured entertainment sites such as the Wiggles and Nickelodeon and instant messaging sites like Yahoo, MSN Messenger and ICQ. Young adults aged 18 to 24 prefer online media sites such as MP3.com and Macro-media. Women aged 25 to 34 lean towards communication-related sites and online banking, while 35 to 54 year olds favour search engines.

The age group that is making the biggest impact online is young adults, according to Stewart-Hunter. "Eighteen to 35 year olds make up 26% of the general population, but 39% of the online population."

Communication boom

Age is clearly an important factor, and Web site producers would do well to remember that the female audience has diverse tastes, depending on age and other factors in their background. However, other research indicates that the popularity of particular types of Web activities is determined by gender.

A report by the Pew Internet & American Life Project entitled *Tracking Online Life: How women use the Internet to cultivate relationships with family and friends* found that many activities are not gender-driven. Young adults of both sexes use the Internet for research, job training, chat, instant messaging, downloading music, seeking information about popular culture, making travel arrangements, banking online and recreational surfing.

However, it also found that women are more likely than men to look for health and

medical information or jobs, play online games, and search for religious and spiritual information online. Men are more likely to look for news and financial information, or information about a product or service, to trade shares, participate in online auctions, look up information about hobbies or interests, seek political information, find information on a government Web site and check sports scores. The report found that men were more likely to get news online to find out what was happening in the world, whereas women were more likely to use the Web to follow up on something they'd heard about elsewhere.

The most revealing difference the report found is that there is an enormous boom in women's use of email. More than any other



application, email is attracting women to the Web in large numbers, and they are using email primarily for the purpose of keeping in touch with family and friends. One of the major advantages of email is its efficiency. Sixty-five percent of women interviewed said email helped them keep in touch with friends and family members without having to spend as much time talking to them.

Time-waster or time-saver?

This timesaving aspect is the essential difference between men's and women's online habits, according to Pippa Leary, business manager for ninemsn's lifestyle and shopping sites. "We were approached by a number of women's portals to work with them. They tried to convince us that women use the Net differently and need to be spoken to differently online. Through research and focus groups, we found that women very

much view the Internet as a timesaving device, not so much as an entertainment medium. They didn't really want to read about celebrity gossip or fashion. What came out again and again was that it's not an entertainment medium, it's a timesaving tool." In terms of the types of content they viewed, men's and women's online habits were very similar, but men tended to use the Web more for entertainment and recreation, and women used it more to save time. "Men also spend more time downloading large graphics," she said.

It could be expected that the online consumption of pornography would follow offline patterns: while the market is predominantly male, there is a significant female audience. Research shows that the female audience for pornography is quite developed in some groups. For instance, Nielsen//NetRatings research shows the most male-dominated sites are visited 91% of the time by men aged 18 and over, but there are sites that only have a 60% adult male audience. Men under 18 undoubtedly make up some of the remaining audience, but part of it is certainly female. Media Metrix's Stewart-Hunter estimated that 15% of the audience for the popular PornCity.Net pornographic sites are women aged 18 to 24, 79% are adult men, and the rest are teenagers.

Strike one

With these conflicting opinions about women's online habits, targeting a female audience doesn't sound all that easy. The first wave of attempts to target women on the Web focused on dedicated women's Web sites. These were often designed in a stereotypically girly style — pink and mauve colour schemes were popular. The sites revolved around topics that have traditionally been considered interesting to women: family, health, fashion, cosmetics, babies and cooking.

The producers of these sites believed that the way to a woman's heart was through her credit card, so shopping featured very heavily. For example, when cable TV shopping network TVSN launched its Web presence through AOL last year, TVSN's CEO Michael McNabb told *Newsweek*: "With the number of women online increasing rapidly, it becomes vitally important for us to have a strong online presence". AOL's managing director at the time, Carol Veriga, said: "[Women] are an extremely important component of our rapid growth and the emergence of AOL and online services as a mass-market medium in Australia".

Rosie Cross sees these attempts to attract women as a cynical and manipulative

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attempt to cash in, and essentially the same as the attempts of the traditional media to target a female audience. "It's simply same old, same old. We know some people get sucked in, while others just know it's crap," she said. "Who is interested in reading shite online? You can spend a few bucks on your favourite crappy magazine and find out how to please the man, how to ensure you keep the man, how to pretend the man is perfect, how to cook for the man, how to make yourself sick with dieting, how to make yourself sick about not pleasing him, but who cares?"

"I can see why they're doing it — this is what's been working for women's magazines, why can't it work for the Web as well?" said Kylie Gusset, a Web designer and publisher of the gusset Web site (www.gusset.net). However, she is also sceptical of the idea that this sort of content actually appeals to most women. "A lot of women buy those magazines to see what's going on in the world and take the piss out of them."

Flawed assumptions

Not surprisingly, the 'if you build online shops, they will come' philosophy was not successful. Although the latest figures show that women shop online almost as much as men, Web sites cannot live by ecommerce alone. Women's online network, iVillage.com, was launched in 1995, with the stated goal as focusing on health, food, parenting, shopping and other areas of interest to women between the ages of 25 and 54. This year, the site suffered heavy financial losses and two top executives resigned. It also began talks to sell its ecommerce site iBaby to babygear.com. Other dedicated women's sites have gone the same way. This year, Women.com also closed its shopping site, and Oxygen cut back its online shopping activities. "At this time, ecommerce is not a business model we want to follow; we don't feel it's the right way to serve our customers," Oxygen's vice-president of communications told CNet.

In addition, the assumption that all women will be interested in a generic women's Web site is rather shaky. "One of the most bland and unsuccessful strategies they've been trying is creating a site for women," Walsh said. "All kinds of women, mind you. It doesn't matter that women are many different kinds of people with very diverse interests. How can you assume that millions of women, just because they are the same gender, would be the same in any other way? There are many differences in experience, interests, professional development and life stage. It's not going to work and they're fools to expect that it will. It's not just cynical, it's plain ignorant."

Now what?

It appears there is no simple formula for attracting a female audience, and it may even be a mistake to try.

Some analysts believe that the approach to online shopping taken by many Web sites does not appeal to women. Correct the method, and women will gladly shop there. For example, Forrester Research analysts Edwin van der Harst and Andrea Zanetti Polzi think shopping should be put in a more social context, mirroring the real-life shopping experience. They say shopping sites should offer chat rooms where women can exchange information about purchases with other shoppers.

ninemsn's Leary believes the key to attracting a female audience is all about the packaging, keeping in mind that women use the Internet primarily for convenience. "If you throw in shopping that really saves time, women will go there, but if it doesn't save time, why would they go?" she said.

Leary thinks it's futile trying to create content specifically for women. "We watched the women's portals spending a lot of money on marketing and creating content for women and we were never convinced that it would work," she said. "We found that a lot of the content we already had on ninemsn, we could repackage for women — making it easier for women to find. For instance, we pulled out information from Monster [ninemsn's job-hunting site], repackaged it for the Cleo Web site and called it Cleo Careers." Another important factor for a female audience is keeping the technology completely transparent. "If you put Flash on a site or Java or image rollovers, you lose the traffic. Women just aren't impressed by that sort of thing."

Give them what they want

Another emerging school of thought is that Web sites should try to focus on types of content and that producers should realise that their audience will never exclusively consist of a particular demographic group. This would not give Web

site producers a neatly defined readership to pitch to advertisers, but a site created with this approach should be more satisfying for users. In the end, this would result in a larger and more loyal audience.

"I'd like to see a more diversified world where there will be far more specialised niche sites that may not specifically target a gender or an ethnic group or an age group," Walsh said. "By virtue of the topic areas they cover, they would attract a certain group that may be more female or lean

towards a certain age group or a certain ethnicity. That's because of the content they offer, not because they set out to cater directly to a particular demographic."

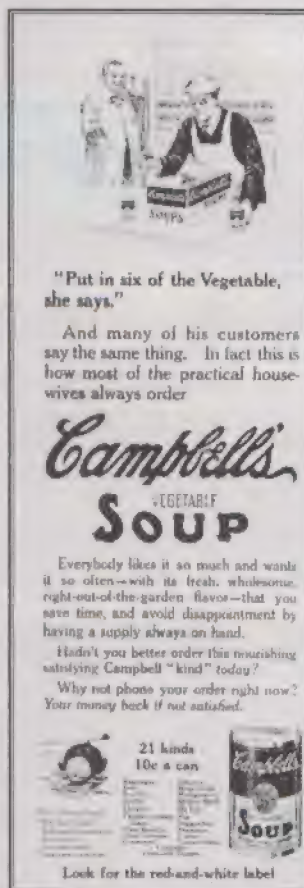
Sites that have set out to do this have done well in their particular niche.

"Despite the people who think geekgirl is for chicks only, I get lots of guys as well," Cross said. "I find my audience has always been intelligent and they enjoy a good laugh. I like the fact that it/I can get goofy and stupid, and I like the fact that my audience is allowed to be that way too."

"I think my audience is now turned on to the death of 'mainstream', and they are very much people who enjoy harvesting news and information from non-traditional sources. My audience is fairly savvy about not joining the ranks of the desperate and dizzy. They're pretty focused, with little time for bullshit or pretension."

"One of the sites that has proved to be a winner is Nerve (www.nerve.com)," Gusset said. "It's not aimed solely at women, but a lot of content has been written by women, and a lot of women are working behind the scenes and making decisions about how it is shaped. It seems to say that 'we don't mind who you are or what you do, if these are your interests, go for it.'"

Like television, increasing the number of women involved in the choice of content would be a step in the right direction, according to Gusset. "There aren't that many women involved in the decision-making side of building these sites — even the ones aimed at women are most often designed by men trying to work out what women like. It would be interesting to see what would happen if women's sites were designed by women." ■



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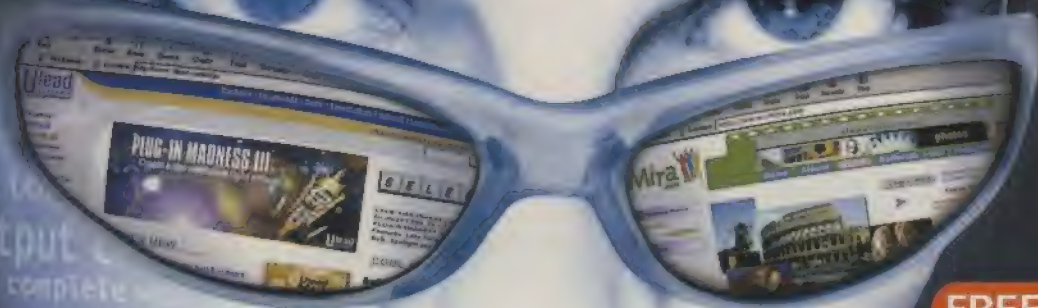
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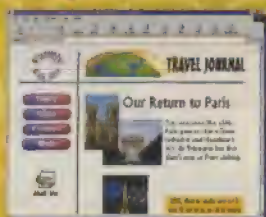
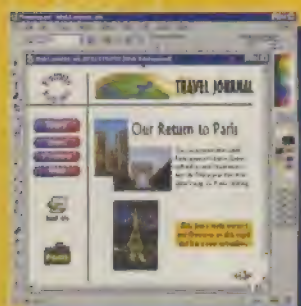
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Power to you

Today's notebooks offer speed and storage capacity to rival a desktop PC, with the added bonus of mobility. However, without a reliable, long-life battery, they're nothing more than very expensive paperweights. The lack of power-efficiency has long been the bane of the notebook owner's existence, prompting manufacturers to focus on improving battery life.

Fiona Williams finds out whether the latest notebooks that promise both power efficiency and top-class performance really go the distance.

One of the problems with using a notebook is that you can't stray too far from a power point for too long. Notebooks appeal to those who demand mobility and desk-free computing, but in reality, the speed with which batteries fail can limit your freedom to travel.

As most notebooks now offer speed and memory comparable to a desktop PC, the remaining challenge for notebook manufacturers is to increase the power efficiency of the battery pack. A notebook that works as hard and puts in as many hours as you do is still out of reach, but at least manufacturers seem to be getting the right idea.

Intel has begun to address the need for good battery life with SpeedStep. The technology allows you to operate at the

full clock speed when connected to a power source, and provides an option to revert to a lesser speed to conserve battery life. Transmeta offers a similar solution with the Crusoe, which scales back the processor speed to the minimum required by a given task. For instance, if you are watching a DVD movie that requires 700MHz for the first 10 minutes and only 500MHz for the rest of the film, after 10 minutes the Crusoe will drop to 500MHz to save battery life.

Of course, neither method takes into account the drain caused by the hard disk, screen or CD-ROM drive, which are far heavier users of power than the processor. However, they do keep a little in reserve to allow you to complete a task, or at least watch a bit more of your movie. The reasoning behind this is that

most people will accept a trade-off in speed if it means more battery life. This makes sense, as notebooks are generally used as productivity aids rather than processing workhorses. Any features that save battery life are always going to be well received.

For this notebook review, APC asked manufacturers to provide their most power-efficient notebooks that also offer the fastest performance capabilities. The response was promising, as many of the notebooks we received feature SpeedStep technology.

APC Labs subjected them all to a range of benchmark tests designed to determine the performance of their processors, disk and graphics subsystems, their overall performance and, most importantly, the life of the battery.

Compaq Armada E500

The Compaq Armada E500 is designed with simplicity in mind. It's a basic unit that would suit those who want a mobile helper for their desktop PC, but don't intend to use it as a desktop replacement. It's similar to the VAIO PCGX7 in that it doesn't focus entirely on business operations.

This notebook could be your best choice for travelling, as its battery lasted the longest at full 700MHz power. The SpeedStep battery-saving feature drops the processing speed to half and, in testing, this translated into a further 30 minutes of work time. The full running time came in at four hours and 16 minutes. In terms of battery life and power management, the Armada E500 is an excellent choice. The SpeedStep feature allows you to breathe new life into your battery if you don't mind sacrificing processor speed.

This notebook provides parallel, serial, audio and USB expansion ports. However, if you need more ports than these, a replicator port is offered as an optional extra for a further \$320.10.

The ATI Rage Mobility-P graphics controller didn't add much to the Armada E500, with poor results in both



the Ziff-Davis Business Graphics WinMark 99 and the High-End Graphics WinMark 99 tests. It was blitzed by the top-scoring Inspiron 5000, and placed last in both categories.

However, the Armada E500 has considerably more memory than the Inspiron 5000. It could do with more than the stan-

dard 64M, and is overshadowed by the Tecra 8100 and the VAIO PCGX7, both of which offer 128M. It has 12G of hard drive space and a secondary cache of 256K.

Multimedia capabilities are a definite high point of the Armada E500, and the Compaq drive performed well in the Video2000 tests. Overall, it placed third behind the Inspiron 5000 and the Armada M700. It's also one of the cheapest notebooks we reviewed.

If you need to extend the life of your notebook when away from a power source, the timesaving features of the Compaq Armada E500 make it a sensible choice.

- Pros** Excellent battery life, aided by SpeedStep
- Cons** Could do with more memory

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Compaq Armada M700

The Compaq Armada M700 is the most portable notebook in this review, weighing in at only 3kg when fully equipped for travel with battery and cords attached. It is also the thinnest, packing its features into a relatively narrow 2.8cm frame.

Portability and mobility are the main advantages this unit has over the competition. In other areas, it is much the same as the E500, with a 12G hard drive, ATI Rage Mobility-P graphics controller and the same array of parallel, serial, audio, video and USB expansion ports. As for the E500, the port replicator for this unit is available for an additional \$320.10. It also has 64M of memory. This puts it behind the Toshiba Tecra and the Sony VAIO, which have twice the memory.

The M700 will run for three hours and 17 minutes before you have to charge up again. The SpeedStep speed reduction option is not very effective in this model. The difference in battery life is negligible, translating into only 18 minutes of extra travelling time.

When the processor is operating at its



full 750MHz capacity, the Armada M700 performs well. In the Ziff-Davis FPU WinMark 99 test, it shared top honours with the Inspiron 5000 and the Tecra 8100. The hard disk drive also performed well in the High-End Disk WinMark 99, where it came second to the Tecra 8100.

The business side of things proved to be the Armada M700's weakness. The Business Disk WinMark and Business Winstone tests highlighted the shortcomings of the unit. It ranked last in both categories and was easily outclassed by the Tecra 8100, the clear winner. However, when you just want to play, the Armada M700 is a good choice. The multimedia capabilities were excellent, with the system performing well in the Video2000 tests for video streaming and DVD playback. It came second overall to the Inspiron 5000.

Like the Toshiba Tecra, the Armada M700 offers an impressive three-year warranty that includes parts and labour.

- Pros** Lightweight
Portable
- Cons** The SpeedStep does not save much battery life

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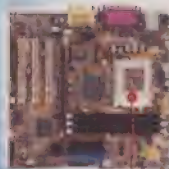
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Dell Inspiron 5000

Weighing exactly 4kg when fully equipped for travel, the Inspiron 5000 could be a burden out on the road. However, its weight is also an advantage, as it makes for a sturdy notebook. Typing is particularly comfortable; the unit is strong enough for your arms to rest comfortably on the rest pad without fear of the 14.1in screen toppling when you're away from a desk.

The Inspiron 5000 has an array of expansion ports: parallel, serial, TV out, audio in/out, PS/2, USB and IR. A port replicator is also available for an additional cost. However, the machine is let down by having only 32M of SDRAM. This compares very poorly with the Sony VAIO PCGXE7 and the Toshiba Tecra 8100 which come with 128M of SDRAM.

Despite the lack of SDRAM, the Inspiron put in a solid performance in the benchmark tests. Unsurprisingly, its Pentium III 750 processor shared top honours with the Tecra 8100 and Armada M700, and the unit powered through SYSmark2000 applications.

The 8M ATI Rage Mobility-P graphics card produced excellent graphics at both



the business and the high-end 3D and multimedia levels. It proved itself particularly good at 3D rendering and multimedia functions, so gamers ought to have some fun with it as well.

Like most of the notebooks reviewed, the Inspiron 5000 comes with a DVD-ROM drive, which provided excellent overall DVD playback. It was the obvious winner in the overall Video2000 category, with a clear lead over nearest rival, the Tecra 8100.

Like the Sony VAIO PCGXE7, the Inspiron 5000 does not have a power management function such as SpeedStep, but it doesn't do too badly without it. Its battery lasted three hours and 17 minutes — the same result that the Tecra achieved with the aid of low-power SpeedStep.

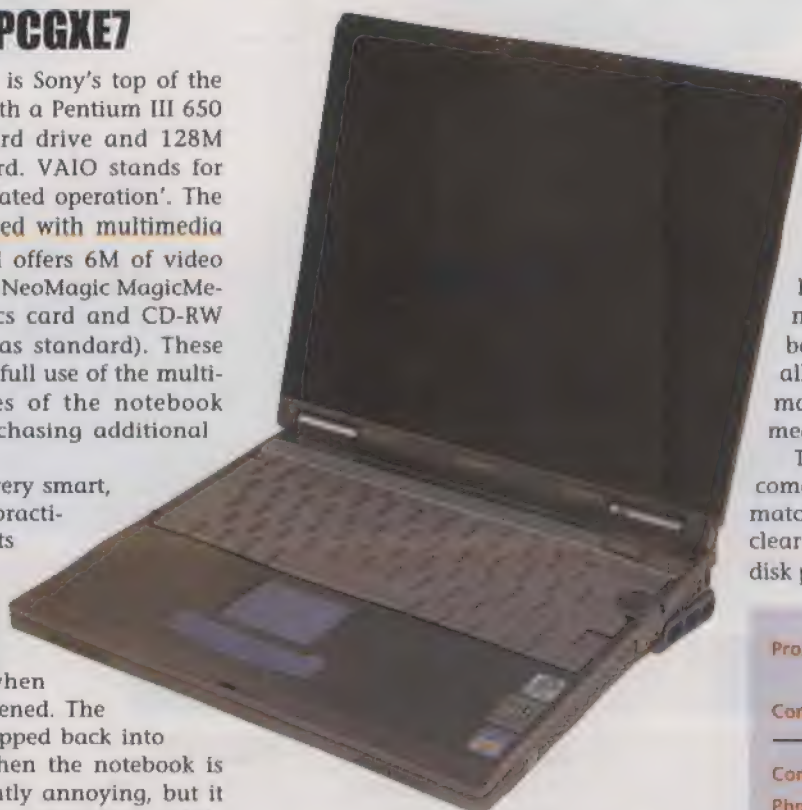
- Pros** Solid performance
Respectable battery life without the aid of SpeedStep
- Cons** Needs a lot more SDRAM

Contact Dell
Phone 1800 812 393
Online www.dell.com.au
Price \$5,381

Sony VAIO PCGXE7

The VAIO PCGXE7 is Sony's top of the range notebook, with a Pentium III 650 processor, 18G hard drive and 128M SDRAM as standard. VAIO stands for 'video/audio integrated operation'. The notebook is designed with multimedia tasks in mind and offers 6M of video RAM courtesy of its NeoMagic MagicMedia 256XL graphics card and CD-RW drive (both come as standard). These allow you to make full use of the multimedia capabilities of the notebook and save you purchasing additional storage devices.

The unit looks very smart, and incorporates practical elements into its design. A vent at the rear of the unit for cooling the mighty hard drive flips open when the notebook is opened. The vent has to be snapped back into place manually when the notebook is closed. This is slightly annoying, but it means additional airflow is possible even when the notebook is not in use. The open vent also angles the keyboard for easier typing.



A mini docking station comes with the notebook. This provides additional USB and PC Card slots (one Type II and one

Type III) along with those already provided on the unit.

Battery life is the VAIO PCGXE7's least impressive characteristic. It came last in the battery life category, only managing two hours and 31 minutes — an hour short of that claimed by the manufacturer. Admittedly, the notebook boasts the heftiest hard drive of all those reviewed. However, its power management and efficiency just didn't measure up to the competition.

The 18G hard disk didn't manage to come first in the benchmarks. It was no match for the Toshiba, which was the clear winner for general and high-end disk performance.

- Pros** Looks nice
Big 18G hard drive
- Cons** Shortest battery life

Contact Sony
Phone 1300 13 8246
Online www.sony.com.au
Price \$6,799

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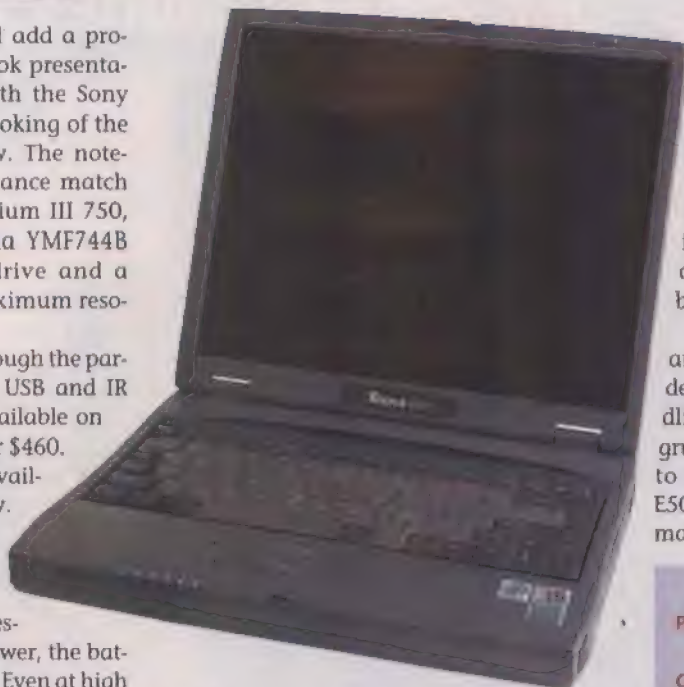
Toshiba Tecra 8100

The Toshiba Tecra 8100 will add a professional look to any notebook presentation. It shares first place with the Sony VAIO PCGXE7 for the best looking of the notebooks sent in for review. The notebook's features and performance match its good looks: it has a Pentium III 750, 128M of SDRAM, a Yamaha YMF744B soundcard, a DVD-ROM drive and a 14.1in TFT screen with a maximum resolution of 1,024 by 768.

Expansion is available through the parallel, serial, monitor, audio, USB and IR ports, and extra ports are available on an optional port replicator for \$460.

Three battery modes are available: normal, high and low. This is an interesting feature, as it allows you to switch to high power when the speed and performance of the processor are paramount. At low power, the battery lasts an extra 30 minutes. Even at high power, the Tecra 8100 outlasted the Sony VAIO PCGXE7 by nearly twenty minutes, with a time of two hours and 49 minutes.

The 12G hard disk drive managed general tasks very well, and scored highly with its high-end disk capabilities. The Pentium



III 750 also performed well in the Ziff-Davis CPUmark and FPU WinMark 99 processor tests, where it beat the other notebooks using a Pentium III 750 processor (the Compaq Armada M700 and the Dell Inspiron 5000).

In the Video2000 tests, the Tecra 8100 did not score as well overall as the Inspiron or either of the Armada notebooks. Despite this, playback quality was excellent.

The 3D Savage MX graphics card executes multimedia and 3D rendering applications particularly well, despite its average performance in business applications.

The Tecra 8100 is a good choice if you are only occasionally away from your desktop. It is more than capable of handling tasks that demand a little extra grunt. The battery life does not come close to the long-lasting Compaq Armada E500, but at least the notebook's features make good use of the time available.

- Pros** Excellent use of the 12G hard disk
Stylish design
- Cons** Battery life could improve

Contact Toshiba
Phone 1800 021 100
Online www.isd.toshiba.com.au
Price \$8,822

How we tested

To test the performance of the notebooks submitted for review, APC Labs used the Ziff-Davis Winstone 99 and WinBench 99 suite of benchmark software plus 3D Mark 99 Max from Futuremark.

Winstone 99 runs a suite of modern business and graphics applications. These applications are timed to measure how long the notebook takes to complete these tasks. The Business Winstone result is a comparative score based on how fast the notebook completed the various business applications.

WinBench 99 contains a set of subtests, designed to find out how fast each component of a notebook really is.

Business and High-End Graphics
WinMark 99 tests measure the notebook's graphics performance when performing video tasks associated with common business applications, as well as multimedia and 3D applications.

Business and High-End Disk
WinMark 99 tests provide a measure of how a notebook's hard disk subsystem handles a load equivalent to that demanded by the business applications used in the Business Winstone 99 test.

CPUmark 99 compares how fast the processor, the memory and the cache subsystem are.

FPU WinMark 99 is a 32-bit floating point processor test.

3D Mark 99 Max tests 3D acceleration under conditions that mimic those posed by games and other applications.

Video2000 tests a system's video streaming, DVD/MPEG playback and overall video qualities.

All the notebooks tested were shipping versions available to the general public at the time of publication unless otherwise stated.

Information contained in this article is based on products and specifications supplied to APC by distributors at the time of writing. Readers should check current pricing and specifications with distributors.

These tests were performed without independent verification by Ziff-Davis, and Ziff-Davis makes no representation or warranties as to the results. WinBench is a registered trademark of the Ziff-Davis Publishing Company.

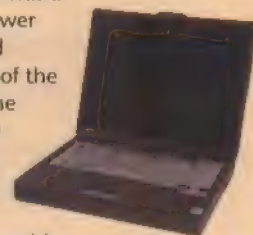


Compaq Armada E500

Highly commended
Toshiba Tecra 8100

As this review was a test of the power efficiency and performance of the notebooks, the Armada E500 deserves first place. The SpeedStep technology provides 30 minutes extra battery life, albeit at a diminished processing speed.

The Toshiba Tecra offers a different approach to SpeedStep. General applications are a breeze thanks to a productive hard drive.



Notebooks: Specifications and results

Product	Compaq Armada E500	Compaq Armada M700	Dell Inspiron 5000e	Sony VAIO PCGX E7	Toshiba Tecra 8100
Contact	Compaq	Compaq	Dell	Sony	Toshiba
Phone number	1300 368 369	1300 368 369	1800 812 393	1300 138 246	1800 021 100
Online	www.compaq.com.au	www.compaq.com.au	www.dell.com.au	www.sony.com.au	www.isd.toshiba.com.au
Price	\$6,795	\$7,795	\$5,381	\$6,799	\$8,822
Warranty	1 year onsite (guaranteed 48hr repair time)	3 year onsite (guaranteed 48hr repair time)	1 year onsite	1 year onsite (courier picks it up and returns it)	3 year onsite
Specifications					
Processor	Pentium III 700	Pentium III 750	Pentium III 750	Pentium III 650	Pentium III 750
Secondary cache	256K	256K	256K	256K	256K
RAM and type (maximum)	64M SDRAM (512M)	64M SDRAM (576M)	32M SDRAM (512M)	128M SDRAM (256M)	128M SDRAM (512M)
Hard disk+ATA2	12G	12G	18G	18.1G	12G
Hard disk controller	SMART	SMART	Ultra ATA	Bus master IDE	Bus master IDE
Video controller chip	ATI Rage Mobility-P	ATI Rage Mobility-P	ATI Rage Mobility-P	NeoMagic MagicMedia 256XL	3D Savage MX
Video RAM	8M SGRAM	8M SGRAM	8M SGRAM	6M SGRAM	8M SGRAM
Pointer device	Touchpad	Touchpad	Touchpad	Touchpad	Touchpad
Dimensions (h by w by d)	4.2 by 31.6 by 25.4cm	2.8 by 31.4 by 24.9cm	4 by 33 by 26.7cm	3.9 by 30.8 by 26.1cm	3.7 by 31.2 by 25.4
Bare minimum weight	2.67kg	2.3kg	3.42kg	3kg	2.5kg
PC Card slot type	Two Type II or one Type III	Two Type II or one Type III	Two Type I or Type II, or one Type III	Two Type II or one Type III	Two Type II or one Type III
Port replicator available	Yes, \$320.10	Yes, \$320.10	Yes (price TBA)	No	Yes, \$460
Docking station available	Yes, \$1,375	Yes, \$1,375	No	Yes, included with purchase	No
CD/DVD-ROM drive	DVD-ROM drive	DVD-ROM drive	DVD-ROM drive	CD-RW drive	DVD-ROM drive
Soundcard	PCI 16-bit stereo sound	Sound Blaster Pro compatible	ESS Maestro 2E	Windows sound system compatible	Yamaha YMF7448
Internal modem	56K internal	56K internal	56K internal	No	56K internal
Display	14.1in TFT	14.1in TFT	14.0in TFT	14.1in TFT	14.1in TFT
Maximum resolution	1,024 by 768	1,024 by 768	1,024 by 768	1,024 by 768	1,024 by 768
Battery type/rated battery life	Lithium ion/3.5hrs	Lithium ion/3.5hrs	Lithium ion/3.5hrs	Lithium ion/3.5hrs	Lithium ion/3.5hrs
Expansion slots	Parallel, serial, TV out, audio in/out, PS/2, USB, IR	Parallel, serial, TV out, audio in/out, PS/2, USB, IR	Parallel, serial, TV out, audio in/out, ext. PS/2, USB, IR	Parallel, serial, TV out, audio in/out, USB	Parallel, serial, TV out, audio in/out, USB, IR
OS available	Windows 95/98/2000/NT	Windows 95/98/2000/NT	Windows 98SE/2000	Windows 98SE	Windows 95/98/2000/NT
Software and accessories	Acrobat Reader	Insight Management Agents and other basic applications	None	PictureGear 4.1, Dvgate 2.1, Acrobat Reader 4.0, Adobe Premiere 5.1, Adaptec Direct CD, McAfee VirusScan 4.5, Media Bar 3.1	None
Benchmark results					
CPUmark 99	63.7	67	67.7	58.2	68
FPU WinMark 99	3,710	3,980	3,980	3,450	3,980
Business Disk WinMark 99	1,995	1,191	2,035	1,920	3,905
High-End Disk WinMark 99	4,190	7,725	5,610	7,090	12,850
Business Graphics WinMark 99	159	191	312	222	188
High-End Graphics WinMark 99	420	594	868	427	616
Business Winstone 99	21.5	21.4	26.8	23	42.7
SYSmark2000	104	108	89	Could not run	245
Video2000 (overall score)	1,646	1,750	2,133	1,378	1,625
BatteryMark: Battery rundown time (hours:minutes)	3:46	3:17	3:17	2:31	3:05
BatteryMark: Battery rundown time with SpeedStep, if applicable (hours:minutes)	4:16	3:35	N/A	N/A	3:18

The products used in these tests are shipping versions available to the public at the time of publication unless otherwise stated. All specifications details are submitted by the distributor and APC accepts no responsibility for any errors within.

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These tests were performed without independent verification by Ziff-Davis and Ziff-Davis makes no representations as to the results.

To test the battery we had APM enabled on all notebooks. All power-saving features were disabled.



Climbing the Tower of Babel

Do you have a great idea for a hot new game, or a clever new accounting package that applies for personal tax rulings on your behalf? Perhaps you're a network administrator who could really use a nifty tool to monitor your printers for paper jams and email the user responsible (rather than yourself). You need programming tools.

David Williams ventures deep into development territory to compare packages.

Years ago, the rise of CASE (computer aided software engineering) tools were predicted to be the death knell of computer programming. Yet, this has not been the case.

Today, it's easier than ever to program your computer, with a wealth of fully-integrated development environments available. These include a com-

piler that converts the programs you write into machine code that the computer can understand, an editor, syntax highlighting, debugging facilities, online help, sample programs, and graphical 'drag-and-drop' components and more.

This means that it is not only professional computer programmers who can

write, debug and release programs with ease. The previously arcane art of computer programming is now much more accessible. It's possible to produce programs that have an attractive interface and provide a good deal of functionality without writing a single line of code yourself.

Let's venture into the world of Windows-based development environments.

Picking a platform

Way back in the computing dark ages — the 1960s — choosing a programming language was simple. If you were writing a commercial application and needed relational database support, you used COBOL. If you were writing a scientific application that processed mathematical formulae, you used FORTRAN.

In the following years, programming languages were pumped out with names that looked like a cat had walked over the keyboard, or as if the Caps Lock key was stuck. Then there were a myriad of BASIC dialects: BASIC, Visual Basic, PowerBasic, muBASIC, QBasic, Simon's Basic, ad infinitum. They gained varying degrees of acceptance and popularity.

Once upon a time you could virtually start a playground war between school children by comparing a Spectrum home computer to the venerable Commodore 64. Until recently, one could even hear the boast, "Why do you use a toy language like Basic? Real programmers write in C." What was it that made one language better than another?

The aim of any language is the same: to achieve a given task, whether that task is turning last month's sales figures into a chart, or rescuing the earth from an alien invasion. Programming languages all work in the same fashion. This is because no matter what language you write in (except for hand-coded binary), the computer can't actually understand it.

Every program must go through a process known as compilation or interpretation, which converts your words and syntax into machine code. It is this code alone that is understood by your computer's CPU.

Each language must provide support for variables that store information; named data items which are accessed and possibly updated by a computer program throughout its lifetime. Each language must have a specified syntax, that is, the collection of keywords that it understands and the grammatical rules that dictate how these can be ordered and combined so as to produce a 'grammatically correct' program.

At the same time, each language is different. The syntax and the underlying keywords will be different. Some might be especially verbose, like COBOL, where you add the value of one variable to another by writing a line like one below.

```
ADD MONTHLY_SALES TO YTD_SALES
```

Others, like C, are especially terse, and the above line could well be written like this.

```
ytd_s += m_s;
```

Some languages have specific purposes. You wouldn't write a fancy user interface in SQL. Similarly, you wouldn't write a full-blown relational database in Fortran. However, you might write a nightly utility to summarise your Unix system logs in Perl, and you might use C to write a driver for a video card.

To obtain greater market penetration, programmers wanted to run their programs on as many different types of computers and operating systems as possible. Obviously, copying the compiled executable program would not work because a Macintosh, for example, had an entirely different processor and instruction set from an Intel-based PC. A Commodore Amiga had a different processor again.

Once upon a time you could
virtually start a playground
war between school children
by comparing a Spectrum
home computer to the
venerable Commodore 64.

This means that the program had to be recompiled on each computer type, so a compiler for that language had to exist for each computer type. This ruled out certain languages that were obscure or machine-specific. One language that particularly benefitted from its general cross-platform nature was C/C++. BASIC was left out because, although Basic interpreters were generally available for any computer, they were rarely compatible.

Integrated development environments

As programming languages developed, particular features became more advantageous than others. Some of these extended the language. Others involved support for new technologies, like XML and COM. There were also some features generally necessary to make a complete and well-rounded commercial application: database support, report writing, help-file generation, source code version control, team developer support.

The integration of these elements and others produced what is known as the integrated development environment. A programmer can write their whole program, debug and compile it, make an

icon, generate an installer and build a help file without leaving the development environment.

Today, languages are no longer considered on their individual merits. Instead, the strengths of specific development environments are contrasted.

Indeed, the underlying language has become almost irrelevant. Do you want to write a program that runs under Microsoft Windows and displays a form that prompts the user to login to a database? You can do this straight away in Visual Basic, Delphi, Visual C++ or PowerBuilder, using built-in tools and components, without even writing a line of Basic, Pascal, C++ or Java. These days, for serious commercial software development on the Windows platform, only these four mainstream languages remain.

Thus, the question no longer becomes whether to use Basic or C, but rather whether to use Visual C++ or C++Builder. The problem is not which language is 'best', but which development environment provides the greatest functionality to achieve your goal, and fits in with any future plans your organisation has.

In the following pages, we explore individual development environments. Let's start with a quick overview of these languages and their strengths and weaknesses.

Basic

Basic was once the most popular language. After years of typing in upper-case with COBOL, who wouldn't jump at the chance to use the 'Beginners All-purpose Symbolic Instruction Code'?

Nevertheless, poor Basic has suffered a lot — it has been criticised as a toy language that tends to promote bad programming practices.

However, these criticisms are unjust. The reality is that, because Basic is so readily available and easy to learn, it appeals to nonprogrammers. A bad program can easily be written in C or Java, but most people who take on C or Java have some programming experience. They've been around the block a few times and have an idea of what works and what doesn't.

Basic is certainly a good language for the complete beginner. Especially with Microsoft pushing VBScript and VBA (Visual Basic for Applications) here, there and everywhere, any serious computer user would be wise to have a working knowledge of the language.

Basic stands up to most demands. However, when your needs become more ambitious — let's say you want to write an international, multilingual truck-fleet management system that needs to generate reports through plugin DLLs

Is C# the key for Microsoft?

I'm sure you've all heard of C# (pronounced "C sharp"). Microsoft is touting this new COM-based language as the next step up the evolutionary ladder for both C/C++ and the Visual Studio suite.

C# is essentially a C-like scripting language. It's claimed to have the best bits of Visual Basic thrown in with the power and functionality of C++, and with some of the more arcane features trimmed off. Additionally, it can run on different platforms without recompiling, provided a C# virtual machine exists for that platform. It loses a little power and performance, but it does provide automatic garbage collection and type safety.

Does it work? Yes, but there's a good reason for that. We might be missing something (we're sure Microsoft will write to say 'yes you are') but we can't quite see the difference between this and a

certain other language that also uses virtual machines. Consider the following C# program:

```
using System;

class HelloWorld {
    public static int Main(String[] args) {
        Console.WriteLine("Hello, World!");
        return 0;
    }
}
```

and its equivalent in this certain other language:

```
class HelloWorld {
    public static void main(String[] args) {
        System.out.println("Hello, World!");
    }
}
```

Java fans will know exactly which other language this is.

Clearly, C# has drawn heavily on Java. Cynics might suggest it is just a reworked Java, produced because Microsoft were unable to dominate Java. A more generous interpretation might be that C# allows Microsoft a way to take Visual Studio forward, by merging the concepts behind Java with the general Visual Studio approach and style. It will be part of the upcoming Visual Studio.Net suite, with a compiler available later this year. The new Visual Studio will put greater emphasis on Web-based applications.

Whatever the case, C# is coming, and can be easily adopted by C/C++ and Java programmers alike. It may even turn out to be a useful intermediate tool that helps Visual Basic programmers move on to Java or C++ in the long term.

without using COM — you may find it's time to move on.

Pascal

Pascal started life as a fictional language invented by Niklaus Wirth to teach computer science. Little did he imagine that someone would eventually write a Pascal compiler. Well, someone did — and many programmers have been grateful ever since.

Pascal has been derided as slower than C, but no-one can deny that the language has a particular grace and elegance. The advantages of Pascal really do come down to its features, such as enumerated types, mathematical sets, and simple file-handling.

In Windows, Pascal really means Borland Delphi. Delphi produces complete enterprise applications, with a strong language and component library, full database accessibility and built-in report writing.

C/C++

C and its descendant C++ are legendary. So respected are C and C++ that many operating systems have boasted that they were written in C, including Amiga, Unix and Windows NT. It has long had the reputation of being fast, portable and powerful. You can perform more functions in one line of C code than you

can in several lines of Basic or Pascal.

Everything in C is fast. Even the name is just one letter. Want to group some code? Forget about real words like 'begin' — in C it's the curly bracket {. Why, in C you can write a line of code like this:

```
a += b += c? 5: 3;
```

Before you know it, you've evaluated a condition and incremented a variable, after having first added its value to a different variable again. C is the language of action, the language that gets right into the guts of the operating system.

Where does C fall down? Its terse nature could well be its downfall. Can you decipher a line like the one above without having to pause for thought? Can you read your own C code six months later? What about someone else's?

If you want a job with Microsoft decoding the next Windows kernel, then C++ is for you. However, it really isn't a language for the casual programmer or someone just starting out.

Java

Java burst onto the scene with a big fanfare: it was billed as a better C++ than C++. Clearly a hot language for the new Internet era, it attracted interest from all quarters. A cute mascot with the name 'Duke', interactive Web sites and the promise of a

truly cross-platform language all boded well for Java.

Unfortunately, in time, the promise of 'write once, run everywhere' turned into 'debug everywhere'. It came to light that Java virtual machines (used to interpret cross-platform Java programs) were not nearly as compatible as had been expected. Additionally, many implementations were bug-ridden and slow, which discouraged the use of Java.

Java's great advantage of platform neutrality turned into a weakness as programmers found that they couldn't do things they were accustomed to. For example, there was no such thing as a Java context-menu because it was designed for the lowest common denominator: a Macintosh mouse has only one button, so therefore there was no right-clicking in Java.

In many ways, this disillusionment with Java was a good thing, because Sun was able to redesign the language and its libraries keeping these experiences and criticisms in mind. The current Java 2 platform is robust and graphical, with support for a good many technologies, such as distributed networking, 3D graphics and email.

Java may not be as fast as C or as clear to read as Basic, but it is definitely worth becoming familiar with it if you want to lead the way in technology. Not only in PCs, but in embedded computers in mobile phones and other devices, Java is essential.



For an overview of some other scripting languages, see this month's cover CD. Also check out the programming columns in Workshop.

Borland Delphi 5

Aeons ago, Borland (now Inprise) had a line of products: Turbo Pascal, Turbo Prolog, and an impressive, fast C/C++ compiler for DOS called Turbo C. Borland's finances and prospects faltered, and to many it looked like the company was heading for destruction.

Then came Delphi, which single-handedly hammered out a rescue. It was quite unlike anything ever seen at the time, even though its concept was just common sense. Delphi is now up to version 5.0 and has brought something new to each incarnation.

Delphi evolved from Borland's Turbo Pascal and is a pure object-oriented language with, as mentioned earlier, some especially elegant features. Pascal is undoubtedly a very clean and well-designed language. Delphi adds to this an impressive suite of components, known as the VCL — the visual component library.

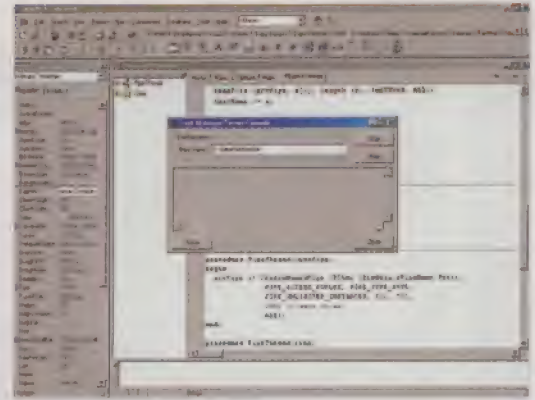
Delphi requires its programs to be compiled before they can be run, and the VCL components can be compiled so as to produce a single, easily distributed EXE file. Alternatively, runtime versions of the VCL can be distributed so as to make a small EXE file. If many Delphi

programs will be running on a computer, then this is a sensible option because it saves disk space and RAM being occupied with repeated code.

Delphi does not provide its own packaging or deployment tool, but comes with a light version of InstallShield which suits most tasks. Report-writing facilities are built in as a set of VCL components called QuickReports. This is a third-party suite, the source code of which can be purchased, along with technical support.

The VCL components can be turned into ActiveX components, which means they can then be used in Visual Basic or any other COM-aware language. Conversely, VCL wrappers can be placed around ActiveX components. The VCL source code is provided with the environment, and this can be searched for advanced insight into how supplied components work.

Delphi is a complete development environment with a high-quality language. It works easily with databases and the Windows API. It gives a programmer



nearly complete control over Windows. The only real difficulty is that the Windows SDK provides examples and help in C++, so programmers need to be familiar with that language to convert Microsoft help snippets into Delphi syntax.

Contact Inprise

Phone (02) 9248 0900

Online www.inprise.com.au

Price Standard \$176; Professional \$1,397; Enterprise \$4,378

Microsoft Visual Basic 6.0

Ahhh, Basic — love it or loathe it, it's inescapable.

Visual Basic (VB for short) is a complete development environment that can be purchased in differing versions with more or less features.

The editor is especially nice as it verifies your syntax as you type. This is because Basic is essentially an interpreted language which means the program statements are converted to machine language line by line while the program runs. This means it's able to run your programs immediately from within the environment, without pausing for a compile (newer versions of VB, however, do allow you to compile into native code).

Visual Basic integrates well with Microsoft technologies, such as Access, SQL Server, Excel and other productivity tools. Comprehensive online help is available with Microsoft's MSDN library. The editor can call up quick tooltips that help you find the function or keyword you are after if you type a few letters and push Ctrl-space.

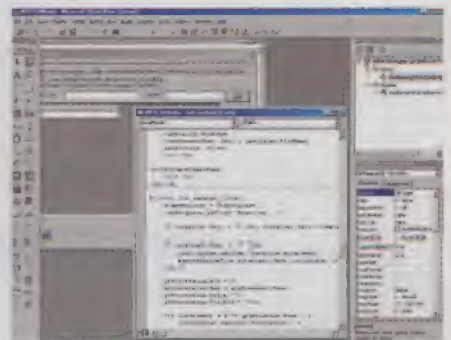
The functionality of the language is enhanced by ActiveX components, which

can be dropped onto a form. However, these components must then be deployed with the application, along with a series of Visual Basic runtime files. There is no option to statically compile all of the individual bits and pieces into one single executable file. However, a 'package and deployment' add-on makes building setup-type installations easy.

With Visual Basic appearing everywhere through Windows these days, it is definitely a language that any computer user should be familiar with. It does have shortcomings of course; although it makes uncomplicated programs simple to create, it is not tremendously useful when you wish to produce a complex piece of software. You cannot create a non-ActiveX DLL for example, nor can you easily enumerate the functions in a DLL if those functions are not known beforehand.

In fact, working with the Windows API is made far more difficult than it need be. Although it works with software components that might be considered objects, Visual Basic is not an object-oriented language. However, many object-oriented features will go into the next version.

VISUAL BASIC



Finally, the error handling in Visual Basic is rather curious. Each subroutine is able to trap errors at just one point. There is no opportunity to respond to errors on a line-by-line basis throughout the subroutine.

Contact Microsoft

Phone 13 20 58

Online www.microsoft.com.au

Price Standard \$206; Professional \$990; Enterprise \$2,353; also available in Visual Studio (Professional \$1,960)



pentium® III

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It's so predictable, you probably already knew we were going to say that.

The hp vectra pc, equipped with hp image engineer, takes the guesswork out of managing your software image. And because hp vectra configurations remain consistent for a 12-month lifecycle, there'll be no surprise changes, which means no re-qualifications over time. But then, you probably expected that.

Demand a better computer.

Borland C++Builder 5

After the success of Delphi, Borland turned its attention back to C/C++. With such a runaway success on its hands, Borland decided to make a Delphi clone that uses C++ as its base language instead of Pascal.

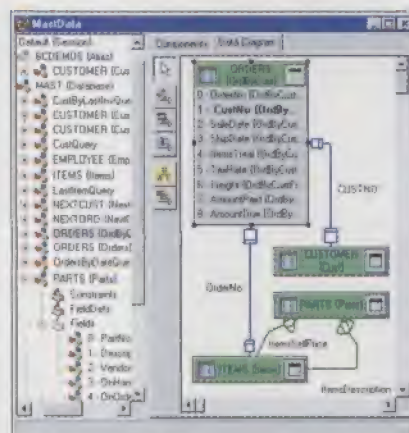
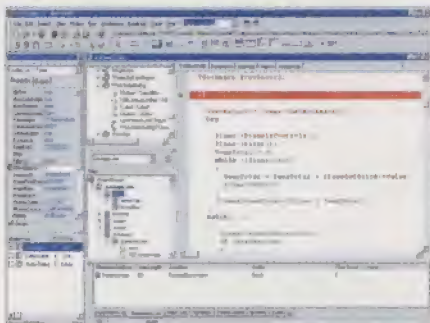
C++Builder spent its early life one step behind Delphi. It was first released at about the time that Delphi 3 came out, with nice features like flat buttons and support for Microsoft Access databases. Borland also added a few features to C++Builder that did not exist in Delphi (at least, not without tweaking hidden registry settings), such as a CPU view when debugging.

C++Builder works in the same form-based, event-driven fashion as Delphi. It

works with the VCL, which was written in Pascal. Rather than port the VCL to C++ and then maintain two code-bases as the tools develop, Borland took the unprecedented step of adding Pascal capabilities to C++Builder, so it can compile both C++ and Pascal. Indeed, a single program can easily consist of both C++ and Pascal modules.

Borland also needed to extend C++ in some ways, for instance by adding support for sets. The upshot of all this is that, for the most part, a C++Builder program is entirely unportable, and cannot be opened or maintained by another C++ development environment. C++Builder does include Microsoft's foundational classes (the MFC) and can compile standard C++ code, but it's unlikely this would be its most common use.

C++Builder is a rapid application development system like Delphi, and allows you to produce fully-functional prototype applications in far less time than would be possible with Visual C++. It mainly appeals to Delphi programmers who want a painless way of moving into C++, and also to C++ programmers who want a way of producing functional prototype applications with minimal effort.



Of course, C++Builder can certainly be used to create complete enterprise applications. You should keep in mind, however, that it's using a somewhat strange version of C++.

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Phone (02) 9248 0900
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Price Standard \$176; Professional \$1,397; Enterprise \$4,378

Microsoft Visual C++ 6.0

When you think about C++, you think about power — and that's what Visual C++ brings to the fore. Every element has exceptional speed and productivity. Shortcuts, wizards, fast help and intelligent agents watching over your coding all help foster the maximum productivity in the programmer.

In addition to this, Microsoft clearly benefits from being the provider of both the operating system and the language. Visual C++ has always had the edge over Borland with new and emerging Windows-based technologies, whether you wanted to integrate your application with ADO for database connectivity, build applications with foundation classes, or exercise the tightest possible control over Windows.

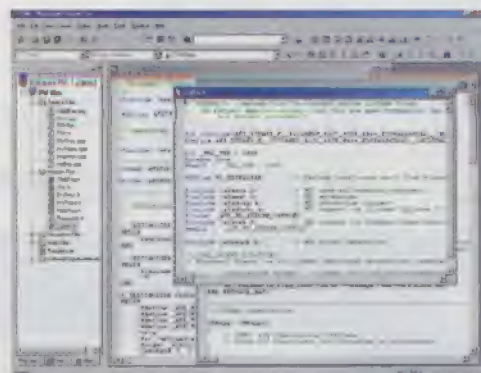
Being part of Visual Studio, programmers are able to use Visual Modeller for application architecture design, deploy self-repairing applications using the Windows Installer, and port their programs to hand-held PCs using the Windows CE toolkit. Visual C++ is only a part of a larger development environment that provides a

rich suite of software tools. This is a major advantage.

Microsoft provides a good range of Wizards with Visual C++ that allow stub code generation for a variety of applications, and with a variety of differing user interfaces. Helpful To-do comments can be interspersed throughout the program code to clarify what must be done to flesh out the program.

Despite its name, Visual C++ is not especially visual — especially if you come from using Delphi or Visual Basic, both of which are very easy to use. However, with perseverance, quality applications can be produced, which have only a tiny footprint on disk and don't consume unnecessary RAM through complex object models or component libraries.

Of all the packages reviewed here, Visual C++ is possibly the hardest package to begin working with. However, as the Windows API is written in C++ and all the SDK documentation lists functions in C++ style, it is the only development environment here that will take the



professional programmer through to the most complex and technical tasks they might seek to undertake.

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Introducing the...

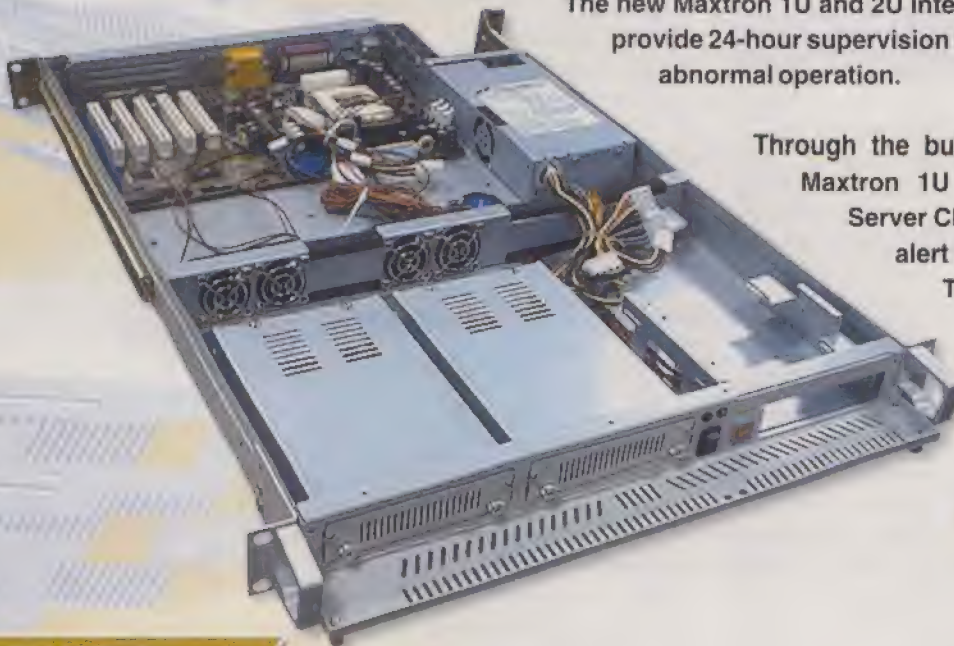
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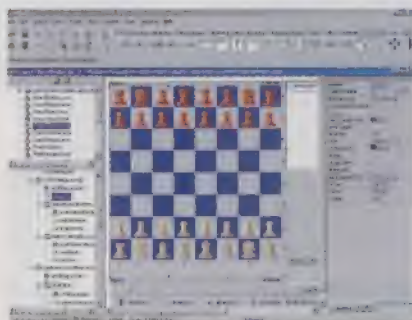
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Welcome!**

Borland JBuilder 3.5

Several years ago, we were eagerly anticipating the arrival of JBuilder 1.0. However, when released, the package fell well short of amazing. A massive 48M of RAM was needed and the package merely lumbered along. Programs had to be saved often, because crashes were frequent.

Yet, now in its third edition, JBuilder is a stable and mature program. It is based on the latest Java 2 platform and allows other Java versions to be plugged in. There is full support for Swing and distributable JavaBeans component. A just-in-time (JIT) compiler provides fast and efficient class file generation. JBuilder also has the advantage of being a cross-platform development environment for a cross-platform language. Borland has versions for Linux and Solaris, as well as Windows. A Mac OS X version has also been announced.

Early Java development environments tried to use the forms and event-driven



'PME' model, as found in Visual Basic and Delphi. This had more or less disastrous results, often requiring a custom file format that stored the form design separate from the logic and source code.

Although this compiled into a class file, the original program code was entirely nontransportable.

Borland has successfully developed an environment which allows full use of PME-style design and rapid application development methodologies, but which still produces a fully text-based Java source code file that can be taken and compiled with any standard Java compiler.

This is done through the use of JavaBeans, which work much like ActiveX components (as with Visual Basic and Delphi) and also by rendering the form design from Java program statements. An analogous model would be the way that most

Web page editors switch between a word processor mode and HTML source code.

A deployment wizard builds compressed jar files that contain precisely the right classes you need to distribute with your application so that others can run it, without either leaving bits out or including too much, which wastes bandwidth and disk space.

JBuilder was the first environment that took syntax highlighting a step further and included hyperlinks to let you drill down through your code. Click on an object reference and suddenly you're taken into the corresponding class definition, with all the available methods listed.

Borland contributed a lot to Sun's JavaBean specification, and many features of the Java 1.1 and Java 2 platforms. Its good understanding of Java internals shows in this product.

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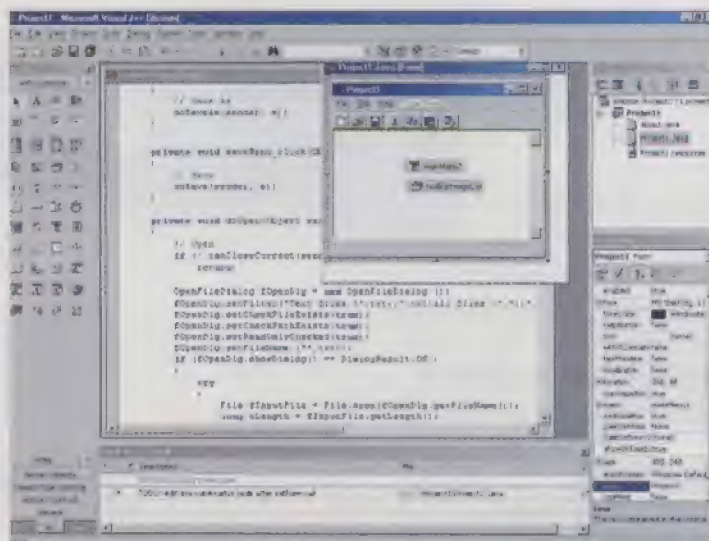
Microsoft Visual J++ 6.0

Is this Java, or is it something else? Sun posed this question when it took Microsoft to court concerning its 'extended' version of the Java language.

Visual J++ certainly produces 'real' Java applets and applications, and can even produce class files that are more efficient than the Sun JDK compiler. However, it also contains language extensions which have the effect of locking the program into a Windows world.

This corrupts the Java promise of platform neutrality. Of course, platform neutrality can be a weakness — and indeed, Microsoft's response is that Windows-specific extensions allow one to write code that is optimised for a specific platform. That is, one can trade off portability with performance.

This has some merits, especially if you appreciate the Java language, but are writing specifically for Windows. However, it goes against the spirit (and perhaps more importantly, the license contract) of Java. It



might also rule out Visual J++ for programmers who write for Unix or other platforms, but don't have any development tools to use on that platform.

That said, Visual J++ provides a pleasant development experience, especially for those who use other products in the Visual Studio range. Visual J++ integrates into

JAVA TOOLS

Visual InterDev (used to make ASP Web applications) and works in a similar style to Visual C++. It compiles to a Windows .EXE file, or produces class or cab files for Web-based deployment. Its database integration tools are well implemented, supporting easy access to ODBC sources. It hooks into Windows DLLs easily, and the component palette is well-stocked with standards-based and Windows-specific components.

Many Java purists have rejected the product because of the Windows extensions. Nevertheless, Visual J++ shouldn't be overlooked.

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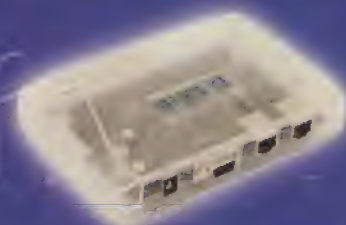


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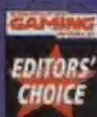
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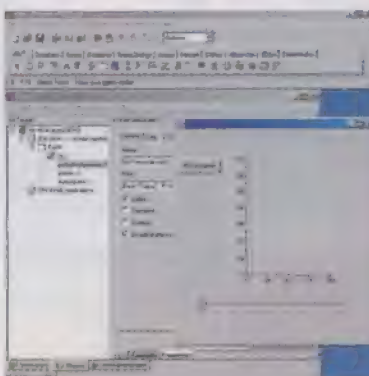
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Sybase PowerJ 3.5

Just as JBuilder is reminiscent of Delphi and Visual J++ of Visual Studio, Sybase's PowerJ is clearly based on PowerBuilder.

PowerJ was the least-appealing editor reviewed here — it seemed full of bugs. We had to click on a button several times before its properties came up, which is very annoying with such a common and necessary task. Unusually, PowerJ uses a proprietary file format that is incompatible with other development tools. It produces normal Java class files, but a project started in PowerJ can't easily be transferred to another environment as the Java source code is difficult to access.



PowerJ does benefit from Sybase's database experience, and a wealth of database functionality is available in JavaBeans. PowerJ also integrates with Sybase's Enterprise Application Server, a high-quality middleware product. The Enterprise Application

Server is a component transaction server and dynamic Web page server and, like Allaire's JRun, executes server-side Java servlets designed with PowerJ.

For those who work in a Sybase environment, PowerJ may fit in well — it emu-

lates the environment of other Sybase development tools, and integrates well with Sybase server tools. However, those new to programming would find the environment unusual and nonintuitive. Also, tasks that you could reasonably expect to perform in microseconds took significantly longer to achieve. However, PowerJ provides a lot of support for distributed applications through its CORBA and IIOP support, and as you'd expect, database access is well implemented through both ODBC and JDBC.

Contact Sybase

Phone 1800 805 349

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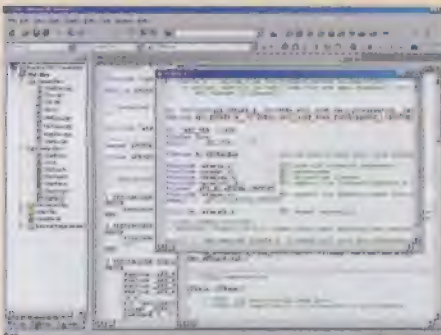
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EDITOR'S CHOICE
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C/C++

Microsoft Visual C++

Visual C++ is the clear winner of the C/C++ platform race, offering power and leading-edge technologies. Being part of Visual Studio, programmers have the extra advantage of Visual Modeller for application architecture design, the Windows Installer for deploying self-repairing applications, and the Windows CE toolkit to port programs to handheld PCs.

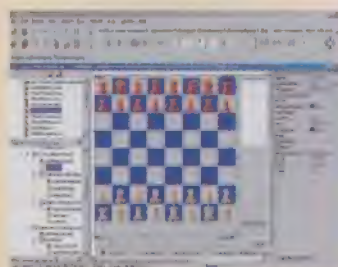


Java

Borland JBuilder

JBuilder takes the lead in the Java stakes. It combines a fast compiler with a robust integrated development environment and the latest Java technologies.

Those who work with multiple operating systems can use their JBuilder knowledge on Windows,



Solaris and Linux. The Sun mantra of 'write once, run everywhere' has been extended by Borland to become 'write once, develop everywhere'. Programmers have suddenly found their entire projects — source code, help files, and environment customisations — are fully portable, not only the generated class files. JBuilder is an excellent tool that everyone can use, no matter what the task.

How we tested

APC's goal in testing development tools for this review was to produce several programs: a traditional 'Hello World' application, a simple one-on-one network chat program, and a graphical application to render a 3D shape.

The language itself was not so important — indeed, Java and C++ clearly have many similarities. What ranked a development environment above another was how well it worked to achieve these programming goals. We looked for relevant wizards to partially build the applications, and inline comments that explained what still needed to be done. Online help was especially important for syntax checking, or for finding out how we could achieve our goals (such as drawing on the canvas in C++). We looked for code samples in the help files that could be cut-and-pasted.

Compilation speed was also a key criterion, as was ease of debugging. For the Java packages, we also compared how easily the environment could package and deploy applets for the Web.

These activities gave a good indication of how much support each package gives a programmer in achieving different tasks, and how well they lend themselves to producing quite dissimilar programs.

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Baby come



Backup software is very important, even if it's not the most exciting of topics. For a long time, the focus has been on backing up critical data — after all, company reports can't be reinstalled the way a spreadsheet program can. This is worthwhile, but there are other benefits to be had by applying the same backup methods to complete systems.

Consider the average Windows reinstallation. Windows takes easily an hour to install, no matter what the onscreen clock might say. You then have to install the drivers for everything Windows didn't spot. This often involves downloading drivers and will take about another hour. Then you'll install and reboot for another 10 minutes. You'll need to configure the

network and then you'll realise you don't recall the exact settings. Another 20 minutes will be spent waiting to hear from support. After that, 10 minutes will be spent configuring the network and then it's time to install the applications. That's probably another hour of installations, reboots and hunting around for lost CDs and serial numbers.

Before you know it, you've lost four hours. Your machine will inevitably need reinstalling again later, so backing up the system will save you a lot of time. You can take an image of the install partition after you've finished your four hours' work, and the next time your system refuses to boot, you can restore it to full working order in a little under 10 minutes.

back

*As operating systems include more and more functions and become easier to use, they also contain more bugs and experience more fatal system crashes. One approach to this problem is to sigh, shrug resignedly and reinstall everything. However, for a small investment in software and hard drive space, you can avoid these headaches altogether. **Alex Kidman** investigates system backup and restoration software.*

A simpler world

Backing up an entire partition isn't for everyone. You need a separate partition and enough space to store your images. You also need to be organised enough to make new images every time you change your system. This is where you need registry backup tools. These tools back up important system files, allowing you to restore back to previous settings. There are two advantages to this system. First, images of the registry and system files take up much less space than whole partition images, even with powerful compression. Smaller also means faster, for both backing up important files and restoring them.

Second, most system backup tools work silently in the background, periodically taking images without intervention. This is great for people who aren't very conscientious about backups.

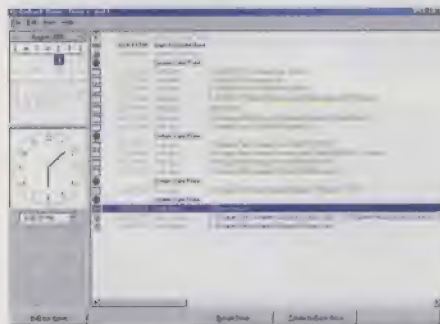
A lot of the packages APC examined for this review also support network installation and the unpacking of compressed images. The main advantage of this is that if you've got a large installed base of identical machines, you can install on one machine, take an image from it, and then deploy this across all your machines. You may still have a network overhead, but it's infinitely preferable to sitting in front of more than 200 PCs, installing over and over and over and over...

Doesn't play well with others

You might be thinking that if using one restoration product is good, then surely using more than one must be better, right? Wrong. Because of the way it works, most system restoration software will conflict violently with other such products. This is what happened on APC's test machine, which developed quite a few quirks after having every restoration product in our review installed on it. The poor machine eventually thought it had somewhere in the region of 300 CD-ROM drives, which caused many system conflicts. Luckily, APC had a lot of system restoration software around, so rectifying the problem wasn't too difficult.

Adaptec GoBack

We looked at Adaptec GoBack in some detail in the August issue of APC (see page 48). If you just want to set up a backup utility and forget about it, GoBack is ideal — as long as you don't tinker with your hardware too much.



GoBack uses a hidden portion of your hard drive (user definable) to store an image of the hard drive. It does this in real time, so you've always got an up-to-date backup of your hard drive and operating system.

On installation, you allocate a portion of your hard drive to GoBack. The default is set at 10%, which took a substantial 1G out of our hard disk. However, you have a lot of leeway with available revision points. Setting up the 1G 'image' takes about 10 minutes, and once that's done, GoBack runs in the background. It pops up in the boot sequence to check for problems, but otherwise you won't notice it's there.

GoBack can recover individual files, and it allows you to view how many revisions of that file have taken place.

Avoid altering your hard drive configurations too much while using GoBack. If you alter the partitions, it gets especially confused. If you add a hard drive, you need to reinstall the entire application.

Nevertheless, GoBack is an excellent product for new computer users. It's almost invisible and very powerful.

Pros Powerful and idiot-proof

Cons Needs a lot of hard drive space

Contact Adaptec

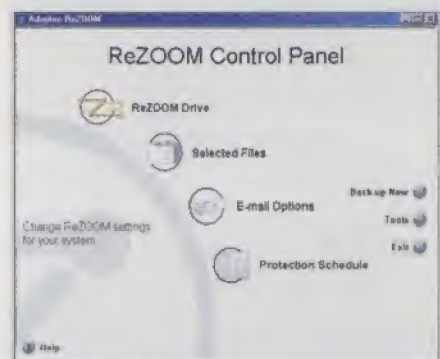
Phone (02) 9416 0687

Online www.adaptec.com

Price \$145

Adaptec ReZOOM

The Adaptec ReZOOM takes the ideas behind imaging utilities like Ghost and continuous backup software like Configsafe, and combines them in one program that works like a software RAID



mirroring array. ReZOOM required more hard disk space than any other product in this review — an entire separate hard drive.

It hides its drive from the operating system, repartitions and reformats the main hard drive, and copies it onto its now-hidden drive. On APC's test system, this took 15 minutes, and four reboots. ReZOOM has an alarming tendency to reboot the system without warning.

Once ReZOOM was running, its effect on system performance was negligible, but it did have the longest installation time. Functioning like a mirrored RAID array, it copies whatever data you select to backup in real time. When booting, the boot manager pops up to give you the option to boot to the ReZOOM drive if you're unable to boot your

regular drive. The program can send failure reports to a third party so users can continue working while the problem is handled.

For individuals, ReZOOM and the cost of an extra hard drive might be too much. However, in a networked environment, where being able to keep working is important, ReZOOM is useful.

Pros Virtual RAID for \$150

Cons Needs its own hard drive

Contact Adaptec

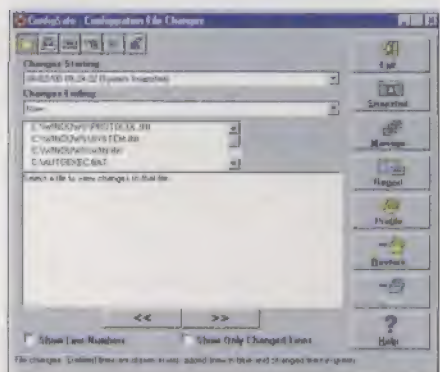
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Online www.adaptec.com

Price \$150

ImagineLAN Configsafe Desktop Edition 3.06

This registry backup product won't save images of entire drives, but it has some great features, especially if you're not as conscientious about backups as you should be.



Configsafe is ideal for nervous users. It takes a 'snapshot' of important system files, allowing you to compare any changes that have occurred. Colours are used to represent the changes, so it's very easy to follow.

Configsafe was the fastest product APC tested. The average snapshot took about four seconds. Even when we installed Configsafe onto a standard APC machine's more complicated registry, the average time was only about 10 seconds. Restoring from snapshots is quite easy, but you're unlikely to do it by accident, as you need to step through five different dialog boxes. You can run Configsafe from DOS if your system gets very badly screwed up.

Configsafe's Install Guard automatically records the hard drive when new software is being installed. It gives you the opportunity to examine what changes have occurred, and to go back if things go wrong.

Configsafe is especially useful for those who often forget to back up their systems before installing new software.

Pros Fast and easy to set up and use

Cons Won't save you from everything

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Phone N/A

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Norton Ghost Personal Edition 5.1

Norton Ghost is a full drive and partition imaging tool that's been around for a while. Ghost Personal Edition 5.1 covers everything except Windows 2000 and Me. It's DOS-based, and running it from Windows can cause problems. For example, after expanding an image of the Win-

dows partition, Windows automatically crashes on return.

The core Ghost application is very simple. You can choose to create ghost images of drives or partitions. You need to be clear about whether your drives are separate drives or just partitions, as Ghost won't save drive images to a drive it's imaging.

Ghost created images reasonably quickly, taking three minutes and 58 seconds to make a 100M image of our primary Windows partition. Restoration was faster, at only two minutes and eight seconds.

Two other utilities are included with the Ghost application: gdisk is an fdisk replacement that works entirely from the command line, and Ghost Explorer allows you to browse Ghost images as if they were zipped archives, and restore selections. Both

are good utilities, but new users could be put off by the basic command nature of gdisk.

One flaw in Ghost, for anyone considering it as a system protection utility, is that it doesn't run in the background the way many of the other applications do. You need to remember to do backups of your system yourself.

Pros Solid and reliable backup

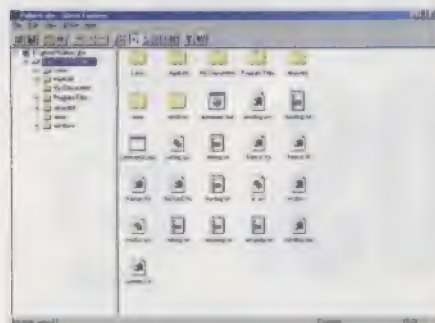
Cons You need to remember to back up

Contact Symantec

Phone (02) 9850 1000

Online www.symantec.com

Price \$162.50



PowerQuest Drive Image

PowerQuest Drive Image creates images of drives and partitions very quickly.

The basic Drive Image utility is DOS-based and only works with certain operating systems (such as Windows 2000 and Linux) through the use of boot floppies

running Caldera DOS. These can be created when the program installs. During the installation process, you can also choose to install common drivers for Zip, SyQuest and magneto-optical drives.

Despite its DOS base, the application's interface is easy to follow. You can add comments to any created image, which is useful if you're going to be creating lots of images. However, the best aspect of Drive Image is its speed. A compressed image of APC's primary partition took just one minute and 44 seconds to complete. Restoring this image was even faster, at one minute and 20 seconds.

Drive Image can also perform virtual drive copies, resizing as it goes to accommodate larger drives than those the

image came from. As part of the restoration process, the existing partition is deleted. This could cause some problems if there is a power disruption.

The least appealing part of the package is the Drive Image Editor, which restores individual files. It does work, but the interface is clunky.

Pros Exactly like Ghost, but faster

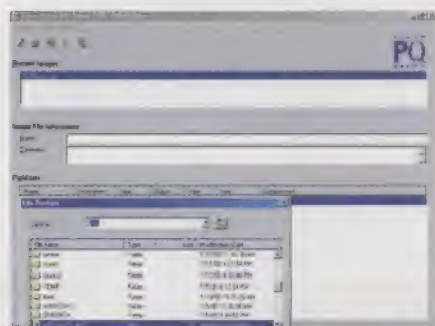
Cons Requires intervention

Contact Marketing Solutions

Phone (02) 9899 5888

Online www.powerquest.com

Price \$141.90



PowerQuest SecondChance

PowerQuest SecondChance has a low hard drive requirement (about 100M) but, it only looks at essential Windows files — drivers, the registry and some program

files. This makes for a smaller restoration size and makes restoring very fast.

The first time it's installed, SecondChance prompts you to create a boot disk. This is sound advice — if your system installation crashes and you cannot boot, restoration will be all the more important.

SecondChance sits in the system tray, taking images of relevant files and monitoring changes. It works from specific images ('checkpoints'), and you have to specify when you want one created.

Restoring from checkpoints is swift, as long as your system boots quickly. The system reboots twice as part of the restoration process, and only about half a minute of the total time taken is spent on the actual restoration process. On our test system, the

entire process took about two minutes, but this will vary depending on your system.

SecondChance won't save you from every disaster. However, it occupies only a small space on the hard drive, and has little impact on system performance. If all you want to do is protect your OS, it's definitely worth considering.

Pros An easy tool to use

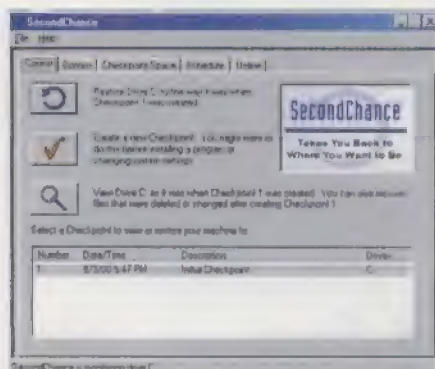
Cons Multiple reboots are inconvenient

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Through the square window

System Restore is one of Microsoft's key selling points for its new consumer OS, Windows Me. The review of Windows Me in APC August (see page 34), noted this feature, but APC wasn't impressed with Windows Me's inflated price. Microsoft has recently announced that it will be slashing the price of the upgrade version for Windows 98 customers by 50%, leaving new users and anyone still on Windows 95 out in the cold. How well does Windows Me System Restore work?

It has reasonably basic features, but that also makes it quite fast. However, other basic utilities such as SecondChance and Configsafe did the job more quickly. They averaged about five seconds for the restore portion of their function, but Windows Me took about 25 seconds. All three options require a system reboot, but that's to be expected, as Windows becomes unstable once it realises its registry has just done a virtual handstand.

In its favour, System Restore isn't hard to use, but it's not very detailed. You can add comments to restoration points you create, but that's about it. The help files say that you will need to reinstall all applications installed after the restoration point date. This isn't necessarily true. If an application does not call on the Windows registry, there's little reason to believe that it'll stop working.

System Restore is only a viable choice if you're already considering upgrading to Windows Me, as it's only available within that OS. It's basic, but it works well, and for the Windows 98 upgrade price (which Microsoft says it will hold until January 2001) it's not bad value. If, on the other hand, you're upgrading from Windows 95, we'd recommend Configsafe for performance and value for money.

Pros Easy to use

Cons You have to suffer through

Contact Microsoft

Phone 13 20 58

Online www.microsoft.com

Price Upgrade from Windows 98: \$106 (until January 15); otherwise, \$206 upgrade, \$380 full version

EDITOR'S CHOICE
Australian
Personal
Computer

Adaptec GoBack

Highly commended

Configsafe

GoBack runs in the background and updates as it goes, which is perfect for absent-minded people. It features low hardware requirements and good running speeds, and it doesn't require you to make your own images.

Configsafe makes registry and system backups easy and fast.

How we tested

All products were installed on a Pioneer K7-650MHz system with a 650MHz Athlon processor, 64M of SDRAM and a 10G UATA/66 hard drive. Software was installed and timed for speed of both capturing and restoring system images from a fresh Windows install. Programs that back up continually were monitored to check their effect on system running capabilities.

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Corporate IT
AUSTRALIA

www.corporateit.net.au

For up-to-the-minute enterprise news and information, check out the corporateit.net.au site. It includes an archive of corporate coverage in APC, as well as continuously updated news headlines from our associated publication **Newswire**. You can also access the site from our main magazine site, apcmag.com.

Patch Panel

The Patch Panel section on CD 1 of APC's cover CD pack includes the latest patches and updates for a wide range of operating systems and applications. Check page 12 for details.

Technology.corp



Welcome to APC's Corporate IT section, a new regular monthly selection of features covering corporate technologies and their implementation.

The corporate world is not new to APC. Many technological developments that end up being adopted by our readers begin their life in a corporate context, such as the system restore software reviewed on page 104. The stability required by large businesses often shapes the mass market; witness Microsoft's adoption of Windows 2000 as the code base for future operating systems (not only for those designed for enterprise use) or the growing popularity of Linux on both server and desktop systems.

As part of our brief to cover developments in all sectors of technology, APC has always strived to track these kinds of issues. However, in recent months APC has seen increasing reader requests for more detailed reports, both from a technical point of view and from the perspective of their impact on society and business. Also, the recent demise of our associated publication *Corporate IT* has

left a major gap in the market that this new section will help to fill.

All of the topics examined in Corporate IT will be useful to people working in enterprise contexts, but the material will also be aimed at our general readership of technology enthusiasts. In this issue, for instance, APC examines Microsoft's .Net strategy and compares it to similar plans. While the impact of .Net will first be felt in enterprise environments, it could ultimately affect the way most PC users interact with the Internet or even office suites. Similarly, the problem of email security might be more pronounced in the business world, but an understanding of the issues involved is valuable to all email users.

As with every part of APC, reader input will shape the future of the Corporate IT section. Let us know what you think, or what you'd like to see added or changed in upcoming months, by emailing us at apc@acptech.net, or contacting us through one of the other methods listed on page 16.

The APC team

What's the catch with .Net?

It could be more than a year before Microsoft's .Net strategy takes off, but the software giant's strategic vision has been under attack since it was first announced in June. Is this the future of software, or is Microsoft just making a late grab for the thin client/component software market? Angus Kidman and William Maher investigate.

Microsoft has never been embarrassed to be the last one at the party. In late June, the software giant launched its Microsoft.Net initiative. According to Microsoft chairperson and chief software architect Bill Gates, this is a plan to "move beyond today's world of standalone Web sites to an Internet of interchangeable components, where devices and services can be assembled into cohesive, user-driven experiences". New versions of Windows, new models for accessing Web content and new development tools are all part of the initiative, which has been launched with much fanfare at a global developer event at Microsoft's Redmond headquarters.

Critics have said that the Microsoft.Net project resembles the 'network computer' vision long promoted by key Microsoft rivals such as Oracle and Sun. It promotes a vision in which the browser becomes the access point for other applications, people can access customised services from a variety of devices, and software can automatically be updated across networks. Silicon Valley observers, accustomed to painting Microsoft as a shameless recycler of others' ideas, have been quick to identify .Net as another example of this tendency.

Others have pointed to Microsoft's renowned penchant for 'vapourware', and the often lengthy lag time between its visionary pronouncements and product delivery. "While a services-based approach is the correct vision for delivering corporate portal infrastructure, .Net will have minimal corporate impact before 2002/3," analyst company the Meta Group noted after the strategic announcement, adding that most corporate clients wouldn't see full delivery until at least 2004.

Microsoft's dominance of the OS market means that the strategy will need to be seriously examined by both its customers and the corporate community in general. Microsoft has to tread carefully. Its current antitrust battle centres around its integration of Internet Explorer into Windows. The ambitious — if at this stage unclear — scope of Microsoft.Net will undoubtedly

attract more attention from regulators. Even if Microsoft can negotiate these obstacles, a bigger question remains: is there any meat on the bones of this vision?

Client time

The resemblance between .Net and previous plans for component-based software distributed through TCP/IP is certainly striking. The key difference is that, as always, Microsoft's plans centre around its existing products, notably Windows 2000 and Office. A new version of Windows, tentatively known as Windows.Net, is scheduled to appear in 2001 (although Microsoft's track record in OS delivery suggests this date is probably ambitious).

Windows.Net will feature what Gates calls the Universal Canvas (effectively a single browser container for accessing all services). Later, Microsoft also plans to release Office.Net, which will tie its market-dominating suite into the new system. Recent betas of Office incorporate some of those features, but how many of them will make it to the next commercial release, or even when that release will be, remains open to conjecture.

The company is also working on a new Internet access client, called MSN.Net, which is designed to tie in the new vision with existing technologies such as its Passport verification service. Microsoft is planning to use XML to provide cross-platform access to the services, but delivery to existing Windows clients will be the priority.

Developing plans

Development tools weren't discussed much when .Net was first announced, but now it seems that the majority of products said to tie in to the strategy (and which have a firm release date) fall into that category. Microsoft is planning an Australian spring release for seven new editions of enterprise server products all designed for Windows 2000, including SQL Server 2000, and a range of development add-ons.

Your server or mine?

As well as countering the threat posed by thin clients, Microsoft's .Net strategy may also be a reaction to the growing success of Linux, especially in the server market. Numerous manufacturers have outlined plans to adopt Linux as a key component of embedded applications. Its stability is seen as a critical advantage, while the perceived 'familiarity' of the Windows interface isn't a major issue in this context. By more actively breaking Windows and other services into components, Microsoft hopes to make a better impression on that segment of the market. Of course, it would help its case if more of these 'building block services' were actually available.

The success of Linux is undeniable, but its overall impact on the software giant is less clear. From a fiscal point of view, Microsoft doesn't need to make the changes suggested by the .Net strategy — its server division is one of the most profitable parts of the company. The most recent server market share figures from IDC show strong growth for Linux, but these figures don't represent as much of a threat to Microsoft as to its rivals.

The IDC numbers show that Linux has now taken on the number-two position, displacing long-time runner-up Novell. IDC is predicting a compound annual growth rate (CAGR) for Linux of 28% between 1999 and 2004.

However, because it is open source, revenue growth in the server market sector will be almost nonexistent. In the same time period, the CAGR for server revenue will be just 1%, despite overall shipment growth of 17%. By 2004, Linux server revenue will be \$US85 million, up from \$US67 million last year.

IDC put this growth in perspective by pointing out that Microsoft made the same amount in server revenue by the third working day of January in 1999.

Officials said it will be the first time Microsoft has released so much code in such a short time frame. "It will be more code than Microsoft has ever shipped. Probably more code than has ever been shipped in the industry," said Michael Risse, marketing manager for Microsoft's server division.

Each of the seven new server products, including a beta version of the company's Visual Studio development environment, will have XML 'baked in'. SQL Server 2000 can receive and answer database queries over the Internet in XML format. XML also allows small businesses using BizTalk Server 2000 to automatically reformat purchase orders received through the Web. Australian software developers got their first taste of the strategy at Microsoft's annual Tech.Ed 2000 developer conference in Cairns during August, where the company also talked up the role of SOAP (Simple Object Access Protocol) as a standard for tying data together.

History repeats

Some of the plans within the .Net strategy directly revisit failed Microsoft visions from the past. For instance, one proposed addition to the MSN.Net service is a range of targeted consumer services which will require paid subscription. This is a similar model to the original bundling of MSN with Windows 95, which was rapidly jettisoned when the open Internet began to take hold. Microsoft's subsequent experiments charging for online content and services have had mixed results. Attempts to draw in subscribers for magazines such as Salon haven't been very successful, but software-focused models such as BizCentral have had better outcomes.

Other elements of the approach are tied into changes already being made in Microsoft's products. Office 2000, for instance, already utilises XML in its file format. Some developers have criticised the implementation as untidy, but this will probably improve in future releases. The reliance on software components rather than monolithic applications has also been promoted for some time through Microsoft's COM+ architecture (although its vision of what constitutes a 'thin' component is fatter than that promoted by other companies). The increasing visibility of Linux has also inspired some of Microsoft's strategic planning (see 'Your server or mine?').

Other aspects of the plan seem designed to appeal to the same market as Java, the cross-platform development language developed by Sun, which has been a source of some concern (and much litigation) for Microsoft. Most

notable are the company's new 'language independent' development environment and C#, its 'Java killer' language. "By creating a unified platform through which devices and services cooperate with each other, Microsoft will unleash a new wave of developer opportunity and creativity that will move us to a new level of power and simplicity," CEO Steve Ballmer said.

The .Net framework will include a common language runtime and a set of data types compatible with at least 17 programming languages. This means, for instance, that programmers can write subroutines in COBOL and 'call' them from Visual Basic.

"It's groundbreaking stuff. No-one in the industry has ever had a pseudocode layer that is language independent," said Microsoft's Australian marketing manager Terry Clancy. Java also aims at platform independence, but doesn't draw on alternate languages.

These 17 languages include Microsoft's C#, a Java-like language which combines

the popular C and C++. Microsoft has roughly 6 million Visual Studio developers worldwide that it hopes will eventually use C#. It has submitted C# to standards body ECMA to establish its credentials.

To some extent, these credentials will be tainted by the extreme claims made for the product. Microsoft claims C# will be able to work with most common existing languages and provide low-level code calls and platform-specific calls, all without requiring major changes in work practices.

Of course, C# may meet the same fate as Java. Initial excitement over Java lapsed into begrudging acceptance once developers ran into the practical difficulties of cross-platform code. Attempts to standardise the language eventually faltered. Microsoft's often prickly relationship with the standards process makes a similar result even more likely. The real test will come in the next few months, as developers begin working with the products. ■



Securing email in an insecure world

As email becomes more important to business, the emphasis on security increases. David Braue investigates the latest options for ensuring privacy and integrity in online communications.

When news emerged earlier this year that the United States Federal Bureau of Investigation (FBI) had developed a mysterious system called 'Carnivore' designed to monitor the email of those under investigation for criminal offences, the ensuing controversy brought to light a fact that every hacker knows and far too many companies don't. Although it's virtually indispensable in today's business environment, email is inherently insecure.

The security problem does not lie with email itself. It is the worldwide delivery infrastructure, which carries emails from originator to recipient, that is not secure. Australia Post (or its international partners) handles an envelope from the time you send it to the time it's received, but email reaches its destination through a loosely affiliated network of thousands of email servers.

Each of these servers is administered according to different rules and by different people, in environments ranging from ultra-secure to totally unsecured.

Almost all of the tens of millions of Internet users rely on email every day, and companies can be forgiven for thinking that sheer volume will protect their confidential emails from discovery. In most cases they're right. However, with a bit of effort it is possible for hackers to intercept, read and potentially sell confidential company information to competitors.

For the unsuspecting victim, awareness of the theft might only come when leaked financial results send shares plummeting, or when a close competitor releases a product that's too similar to their own to be sheer coincidence. It's also possible that the victimised company may never find out about the theft.

In Britain, the US and elsewhere, government investigative bodies are struggling to find ways to extend their legislative surveillance powers into cyberspace. Companies concerned about security should be considering ways to

secure their email systems against snooping, but need to ensure they retain the instant worldwide access that the Internet affords.



Beggars, tramps and thieves

Since standard SMTP (Simple Mail Transfer Protocol) is inherently insecure, it remains frighteningly vulnerable to manipulation by malicious outsiders with enough determination and time on their hands. There could be an unknown cyberthief reading, copying or even stopping everything that flows through those distant access points.

According to Dan Carosone, chief technologist with Melbourne-based security consulting company e-Secure, "no email that goes across the Internet unencrypted is secure from snooping and capture. Technically, there are lots of ways it could be done."

Malicious system administrators with access to key email routing systems could

configure those mail servers to make extra copies of everything they carry. Crackers could tinker with the DNS (Domain Name Service) containing addresses of Internet servers, and effectively reroute email by making a hostile server (into which email goes but never comes out) look like a legitimate email gateway.

A recent survey revealed that one in five emails never reaches its destination — it simply vanishes into the ether. What if that email contained a draft of a sensitive contract under negotiation, design plans for your company's next strategic product, or a spreadsheet of confidential financial results? It's a wonder we use email at all, but we do, and in increasing volumes every day.

It's difficult to gauge volumes of activity on the worldwide Internet, but estimates suggest that the world's online population will send more than 7 trillion emails this year alone. This volume is steadily increasing as both the number of users, and their everyday reliance on email, continues to grow.

The risk of email being intercepted is real enough that management information systems strategists should be developing ways to counter it.

Hiding behind 1s and 0s

There is no easy way to protect email systems from unwanted snooping, but a good place to start is to encrypt emails as they're transported across the Internet. The easiest way to accomplish this is to use virtual private networking (VPN) tools to create secure 'tunnels' through the Net. All data is encrypted upon entering the Net and decrypted at the other end.

VPNs can be constructed between two individual systems, two servers, or a combination of the two. VPN functions are available both through software clients for standalone PCs, and as a feature of most modern routers, switches and

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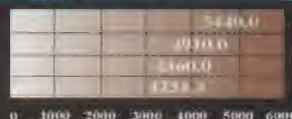
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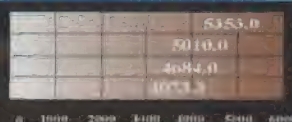
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remote access servers. Most of these use IPSec (Internet Protocol Security) to allow interaction between different VPN solutions. The abundance of early proprietary VPN technologies means it's important to make sure that client and server solutions can communicate.

Once a VPN is set up, all traffic entering the tunnel is automatically encrypted — typically with rock-solid 128-bit encryption that even professional snoops will find extraordinarily difficult to break. When data is encrypted in this way, sniffing tools cannot even tell that it's an email, much less find out what's in the message.

VPNs are indispensable for securely transmitting information between branch offices, but they have limited value in the open Internet. They can't be used to secure email traffic bound for external sources. This problem can be overcome by forming VPN agreements with strategic partners, in which all signatories agree to use an interoperable VPN solution so that confidential information can be freely exchanged.

Some businesses also use domain

aliasing tools so that their real domain names aren't embedded into the emails they send and receive. Disguising originator and destination hosts can make it harder for outside snoops to pick a particular email out of a stream of messages, as scans for a particular company's name will come up blank.

Of course, once email — or any other traffic for that matter — leaves the VPN, it's no longer secure. Risks can be minimised by getting employees to encrypt individual emails they send using PGP (Pretty Good Privacy) or S/MIME (Secure Multipurpose Internet Mail Extensions) technology, which is now built into most major email programs.

Instead of encrypting traffic in bulk, these systems use secret keys to encrypt individual messages into a plaintext email that anybody can read, but nobody can decipher without the appropriate key. With keys of more than 128 bits now commonly in use, these two technologies are the best way of ensuring that snoops can't listen in on your electronic conversations.

Such programs enable secure person-to-person communications, which is one of the main reasons why many govern-

ment bodies have been so reluctant to allow widespread use of long encryption keys. They fear terrorists and other undesirables would be able to collude in secret right under their noses. And they're right: although 40 and 56-bit encryption has been broken, using a program such as PGP to encrypt a message with a key of 256 bits makes government surveillance fruitless. These long keys are currently uncrackable, even using the supercomputing power rumoured to be contained in acres of mainframe systems buried beneath the CIA and various other government agencies.

The discovery of the existence of Carnivore has highlighted the importance of encryption as a first line of defence for protecting emails on the open Internet.

Many companies are also warming to the possibilities presented by digital certificates, which minimise the risk of fraud by appending unique codes to emails that allow the message's recipient to check that it hasn't been tampered with, and confirm the authenticity of the person who sent it. Emerging public key

infrastructures, from companies such as eSign and Baltimore Technologies, are starting to make digital certificate-based email authentication a reality.

However, be prepared for a bit of strife. All the tools you need to enable seamless email encryption are widely available on the market, but deploying them for widespread use can be difficult. A corporate directory service can go a long way towards easing this process, since it can provide a ready-made infrastructure for managing encryption keys.

In setting up encryption, a reliable security firm or systems integrator can ensure everything runs smoothly for you.

"Instead of being a simple email system, companies need to approach this as a larger piece of infrastructure," Carosone said. "It's a lot more complicated and, particularly in the email area, you need to look at standards as much as you can. There's any number of ways to do this, and it's important that people think about it in the broader context. Make sure the various wrinkles and complications are dealt with on a corporate basis and properly; otherwise, you're just introducing complexity into the situation without getting any benefit."

Trapping moles inside the four walls

As privacy advocates in the US wait for the FBI to provide details of Carnivore under that country's freedom of information legislation, the image of the hooded, secretive email thief is ripe for a makeover. In many companies employees are revealing a remarkable predilection towards using email for transporting company secrets to competitors or for their own gain.

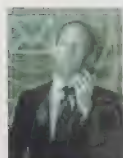
One Australian company found it had been hit by email thieving after an executive received a brochure in his home letterbox advertising a competing product that was identical to one produced by his company. The product had been developed by one of his employees, a woman who had methodically stolen company secrets by emailing commercially sensitive documents to an outside associate for archiving.

Internal fraud is an increasingly serious problem as businesses rely more and more on email as their primary form of communication, but encryption alone will do nothing to stop it.

"This whole James Bond sort of thing [snooping at external email gateways] is something we don't see very often," managing director of Brisbane-based security consultancy WebSecure, Carlton Duston said. "In the real world, we see disgruntled employees or the guy that's leaving [taking proprietary information with him]. They see it as just a part of emptying their desk."

Since email is an easy way for employees to execute theft, a great way to stop them is to install Content Technologies' MIMESweeper, EmUtech's EmU, Marshal Software's MailMarshal, or any of the other tools that monitor SMTP email systems for what's going in and out of the business. Apart from security benefits, these tools are indispensable for blocking unwanted spam, catching virus-laden email attachments and ensuring nastily worded employee emails don't cause legal problems for the business.

Content scanners can be valuable tools in increasing email security against corporate espionage, because they allow businesses to create quite flexible rules about how emails should be analysed and handled. Emails can, for example, be scanned for key words such as company product names, portions of sensitive company documents that should not be emailed, or financial results contained in Microsoft Excel spreadsheets. By applying these rules to all outgoing



One company found it had been hit by email thieving after an executive received a brochure advertising a product that was identical to its own.

People forget anniversaries.

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Rarely, however, do they

forget this.



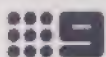
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More than \$200,000 in prizes

First Prize: A stand at CeBIT trade fair as part of Austrade's "Intelligent Australia" presence, \$10,000 on the Commonwealth Bank Business Card, membership of Microsoft's MSDN plus a trip to TechEd in the US, including air-fares and accommodation, Microsoft Back Office Server, five days of Microsoft certified e-commerce training from Comtech, Microsoft's Visual Studio Enterprise Edition, Brother 5-in-1 Multi-Function Centre, a copy of Computer Associates VET Enterprise for 10 PC's, an ASI Solutions multi-media computer, ShortCuts Professional, Two return air fares to CeBIT courtesy of Travel.com.au.

Runner-up: Wins \$5,000 on the Commonwealth Bank Business Card, Microsoft MSDN Annual Membership, Microsoft Back Office Server, Microsoft Workshop, a five day Microsoft e-commerce course with Comtech, Microsoft 2000 Server, a Brother P-touch electronic labelling system, Computer Associates' VET Enterprise (for 10 workstations), ShortCuts' Professional, Windows 2000 Exams.

Internet and Australian Categories

The Internet Application and Australia-specific categories will each receive \$2,500 cash from the Commonwealth Bank, a Microsoft Windows 2000 Exams plus Windows 2000 training seminar and Computer Associates' VET Enterprise anti-virus software.

All 30 finalists will win a copy of Microsoft Office 2000 Developer, Visio 2000 Standard and MS Project 2000 plus copies of the Commonwealth Bank's BetterBusiness Planner and Quicktime Banking software. The 26 other finalists will win a copy of Computer Associates Vet Net Surfer and a copy of ShortCuts' Cash Register.

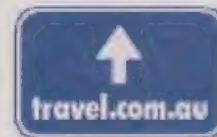
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Entry Guidelines

(Please ensure you read and understand these guidelines)

1. The Small Business Show Software Awards are open to Australian software companies and software developers of business applications. Subsidiaries of overseas companies or their employees are not eligible.
2. The awards are open to all major platforms: Windows, Mac OS, Linux, Unix and OS/2.
3. Each entry must include the entry form, a full operating set of the software and any appropriate manuals or support materials. You may send a demonstration disk in addition to the full operating software for information purposes only. However it will not be considered for the judging process. Internet applications should preferably be submitted on 3.5 inch disk or CD-ROM. Internet applications will be judged online, ensure correct URL is included in entry.
4. The Small Business Show reserves the right to keep each software package entered in order to consider it for future stories for the program. For this reason we suggest that each entrant ensures they retain original/master disks and manuals.

5. Entries must be received by The Small Business Show no later than 5pm Monday November 6. This is an absolute deadline. Entries received after this date be ineligible for judging.

6. All individuals and companies who have entered any of the previous Awards over the past six years are eligible to enter again this year.

7. Employees of the Nine Network and Australian Consolidated Press or any associated companies and their families are ineligible to enter the competition.

8. The software will be judged on it's functionality, local and international market potential beginning with ease of loading, it's system requirements and performance. Some consideration will also be given to the quality and style of the design, packaging and marketing materials for the product. Ultimately, the judges are seeking a product with worldwide market potential.

A representative of The Small Business Show or the judging panel will contact you if further information is necessary.

Entries close strictly at 5pm, Monday, November 6. All entries are maintained under strict security. The finalists will be announced on the Nine Network's The Small Business Show on Sunday, November 26. The winner will be announced on Sunday, December 3. Send your entry to: Software Awards, The Small Business Show, Nine Network, P.O. Box 27 Willoughby, NSW 2068

Full name of applicant/business: _____	Is software package in the market (tick answer) YES <input type="checkbox"/> NO <input type="checkbox"/>
Name of software package: _____	Brief description of software package, it's application and the market for which it has been created: _____
Format/platform: _____	_____
Business Address: _____	_____
Tel/Fax: _____	Website address: _____
Contact name: _____	Declaration: I/we agree to accept the entry criteria set for the Brother Business Software Awards and that the decisions by the judging panel are final. Managing director/general manager/director (print name and sign)
Entry category: Main <input type="checkbox"/> Main & Internet <input type="checkbox"/> Australia-Specific <input type="checkbox"/>	Signature: _____
Name/s of developers: _____	Date: _____
Time frame and Location of development _____	

Entry Form

emails, businesses can create a marginal level of security that should stop many half-hearted attempts by employees to leak information.

However, content filters best allow the enforcement of rules designed to catch sneaky attempts to hide the secrets they're emailing out of the business. Conventional content scanning would never, for example, be able to check an email that had been encrypted, or look inside a password-protected ZIP file.

Rules can be created that allow a content scanner to identify when emails have been encrypted or ZIP files can't be processed due to password protection. Offending messages would then be quarantined for analysis by the email administrator, who could issue a query to the employee in question.

Let them know you're watching

Even if you aren't actually reading the contents of your employees' emails, letting them think that you are can be a surprisingly strong deterrent. This has been the experience of the NSW Police. It recently worked with integration house Megatec to

install MIMESweeper in an attempt to wrestle back control of its email in response to last year's controversy over inappropriate email usage within government departments.

A legal interpretation of the wiretapping clauses of the Telecommunications Interception Act has prevented the NSW Police from copying employees' emails before they've been delivered. However, this hasn't stopped the department from monitoring the content of outgoing emails and sending warning notices to employees who seem to be violating the policies regarding email use. The policies prohibit most of the force's 17,000 employees from transmitting content such as video files.

Regardless of what system administrators are doing with the content, just knowing that they're being watched has had the desired effect, according to Dennis Dring, client services project manager with NSW Police. "Our hands are really tied in terms of bringing any immediate warnings," Dring said. "But just by watching this stuff go through the system logs, there has been an apparent decrease in the number of image and executable files going through the system. There has been a reaction from staff

that indicates that they're changing their behaviour, that they're concerned about misuse and adjusting what they do accordingly. The warning messages are having a profound effect."

Applying this discipline is an excellent way to decrease the likelihood of employees compromising security using email. It's the digital equivalent of putting surveillance cameras in the supply closet, a strategy that is equally effective if the cameras aren't actually plugged in.

Businesses implementing such a system should also make sure that employees have read and signed an email policy that includes clauses specifically banning transmission of company documents to unauthorised recipients. Backed by the threat of instant dismissal, such policies can be remarkably effective in convincing would-be saboteurs that emailing business secrets just isn't worth the risk.

Effective email security requires technical and policy-based defences that are tightly tied to established procedures and technological infrastructure. Establishing an email defence is far from straightforward, but the investment of time and money is well worth it to avoid even one security breach. **mc**

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Walking on Webs

Citrix has had the upper hand in the thin client market for some time. However, a new challenger is emerging from the corpse of SCO that could provide new opportunities for ASPs and businesses looking at thin client computing. Has Tarantella got what it takes?

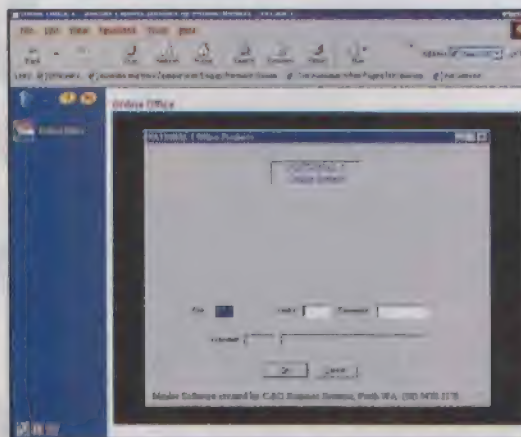


Since it worked with Microsoft to develop the first multiuser version of Windows NT over four years ago, Citrix Systems has enjoyed a virtual monopoly over the market for thin client technology. Thin client servers allow remote users to access server-hosted Windows NT applications in real time, and use so little bandwidth that they're even suitable for dialup modems. Citrix's cosy de facto monopoly is facing its first major challenge this year as Santa Cruz Operation (SCO) bets the farm on its Tarantella thin client software after bailing out of its Unix business in August.

SCO once dominated the Unix-on-Intel market with its OpenServer and UnixWare operating systems, but was crushed by Linux's ability to provide the same technology for almost nothing. SCO bowed to the inevitable and sold its Professional Services and Server Software divisions to Caldera in a share and cash deal estimated at about \$US307 million.

Ironically, the deal was funded partly by SCO, which in January joined Novell, Citrix and two venture capital firms in investing about \$US30 million into Caldera. That money has now helped Caldera gain a worldwide team of software specialists and a mature base of Unix code featuring highly stable clustering, load balancing and other technologies that enhance the appeal of its Linux business solutions.

With its Unix business now in the hands of Caldera, SCO is refocusing its entire business on Tarantella, a once-marginal terminal emulation tool that has become the company's last chance. Indeed, SCO



▲ National 1's Online Office II service using Tarantella

has changed its name to Tarantella to reflect the new direction. Tarantella was originally designed as an OpenServer tool for providing Web-based terminal emulation of Unix servers. However, it has moved into the market dominated by Citrix's MetaFrame solution after a major upgrade earlier this year that added Windows NT server support.

It sounds like a long shot — 'desperate Unix has-been tries to salvage shareholder value by rejigging obscure software to launch a David-and-Goliath attack'. How-

ever, Tarantella believes it has a good chance to rebuild its fortune. The company will be aided by a \$US18 million loan secured during the Caldera deal, money that it will use to increase its profile in the burgeoning market for thin client solutions. The company will target the expanding application service provider (ASP) market and other Unix-based businesses where Citrix is a relative novice. Citrix only ported its MetaFrame technology to support Unix hosts this year.

Since Citrix now supports Unix as well, Tarantella's major drawback will be the differences between its own AIP (Adaptive Internet Protocol) emulation-based client and Citrix's ICA (Independent Computing Architecture) screen-scraping technology. Both are highly optimised for low-bandwidth environments, but instead of transmitting the actual screen information as ICA does, AIP uses client-side intelligence to handle the details of application presentation.

Unlike Citrix's proprietary ICA application, which is freely available for most client operating systems, Tarantella's client-side component is based on Java. This makes AIP instantly portable across most client platforms. Whereas Citrix uses a two-tier architecture in a one-to-one relationship between client and multiuser NT server, Tarantella uses a three-tier architecture. The standalone Tarantella server acts as an application broker that pulls data feeds from a num-

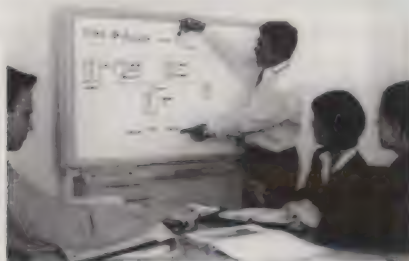
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▲ Tarantella acts as an application broker.

ber of source servers. These can be any combination of 3270, 5250, VT, Windows NT, X Window and others.

"The beauty of Tarantella is that it will instantly Web-enable Unix, NT, mainframe and other applications without the need to rewrite anything," Kieran O'Shaughnessy, regional general manager with Tarantella Australia said. "There are very few organisations that have just one system. They prefer to get access through the applications they like, and we let them do that through the one system. We're about slotting in a new device rather than having to rework your architecture, and to get a pilot up and running we're talking about it taking one day."

The company now has three versions of Tarantella, which will continue to be promoted and supported through Caldera under the terms of its deal. For smaller environments, Tarantella Express supports up to 45 users and only runs on SCO's — now Caldera's — OpenServer. The high-end Tarantella Enterprise II can handle an unlimited number of users, and expands platform support to include IBM AIX, HP-UX, Linux and Sun Solaris. Tarantella's third incarnation, Tarantella ASP, augments Enterprise II with per-user accounting, access control and other features for managing large-scale application rental.

Tarantella in the field

Tarantella's high speed, multiple-platform support and reliability were among the main reasons Melbourne-based Mercy Health & Aged Care decided to use it to deliver its new Compaq AlphaServer and Unix-based IBA administration application to more than 600 people in 10 hospitals and healthcare facilities across Victoria. Mercy uses a secure virtual private network to hook users at its various sites into application servers based in East Melbourne. Webmaster

Chih Min Chan said Tarantella's Java client has made rollout and training on the new application a breeze.

"Everything is Web browser-based," Chan said. "When you go into Tarantella, it seems like you're on the Internet. Those who have seen it like it; Tarantella is amazingly fast, and lighter than Telnet. The idea is to make it as simple as possible, and we feel that by using the Web browser it will help."

Tarantella's three-tier design allows people to start a session from one terminal, disconnect and resume the session later. This is particularly useful in environments such as the Mercy's, where doctors and other employees are always on the move.

Such sessional persistence is possible because instead of connecting directly to the application server as in the MetaFrame model, the Java client applications only communicate with the Tarantella server. The server maintains its connection to the host regardless of whether a particular user's connection drops out. Disconnected users can pick up where they left off simply by starting another session from the same or a different terminal.

National 1, a \$70 million distributor of office supplies, has found the newest version of Tarantella very compelling. The company is in the process of using it to replace Citrix WinFrame, which it has used for four years to give online clients direct access to its internal ordering system. After a recent pilot test confirmed Tarantella's suitability, National 1 is rolling it out for use by several dozen internal employees, and hundreds of commercial customers who will download the Java client and access National 1's systems online through its Online Office II service.

"Citrix was really good for us, but we just kept coming up against the same walls," Denis Jurczak, national IT manager with National 1 said. "Citrix is very tied to the terminal server and the kind of applications you can deploy. It's very intolerant of proxies and firewalls, and you don't have a lot of flexibility in deploying it to certain customers. But with Tarantella, the Webtop is not confined to the Windows desktop; you can put as many different applications in there as you like. This has let us deploy ordering solutions, HTML documentation and outside applications such as email on the same Webtop without having to resort to Windows. Each one of the troubled [Citrix]

sites we've gone to had no troubles getting in with Tarantella."

Tarantella has also improved National 1's internal staff flexibility. For example, if a key employee goes on holidays from one office, a replacement can work from another geographically distant office, and use Tarantella to remotely access all the Unix, NT or other applications they need.

However it's used, Jurczak has found Tarantella's three-tier design far more robust than the Citrix model. He said that Tarantella's AIP is more forgiving of congested and inconsistent connections, as it doesn't try to transmit entire screen images at once. "When a user goes to a Windows session and sees a solid black screen [when Citrix is waiting for a refreshed desktop image to load], it doesn't exactly inspire them with confidence," he explained. "They'll just disconnect the session. But Tarantella doesn't keep you guessing: if the connection is slow, it just works slow, but it won't drop out on you."

Tarantella now faces a massive marketing and education campaign to prove that Tarantella is a better Citrix than Citrix. It will certainly be an uphill battle, given Citrix's dominance in corporate environments and as a method of delivery for ASPs. This is a market niche that Citrix has actively funded since it entered the public consciousness last year.

However, Citrix is struggling lately, with shares plunging more than 60% in a week last June after the company announced its revenue would fall far short of analyst expectations. Given that the turbulent market, fuelled by slow **takeup of Windows 2000**, has hit even the undisputed market leader, Graham Penn, market analyst with IDC Australia, said SCO has to act fast to establish its new market identity.

"SCO was under a lot of pressure, and the thing they do have going for them is Tarantella," Penn explained. "But the question is whether Tarantella can support a scaled-down company. Citrix has had its day in the sun, but it picked up all the low-hanging fruit — and I'm not sure it has a guaranteed long-term position either."

"The market is moving on very quickly, and I'm not sure how much larger the market is for thin-client solutions. Tarantella will have to establish a very clearly defined market position for itself, and just doing what Citrix did, won't be sufficient. It'll have to offer some other benefit, and clearly enunciate that in the market. Maybe Tarantella can do that, but if it takes any longer than six to nine months, the company will miss out altogether."

David Braue

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How does increased specialisation by service providers affect outsourcing?

Special service

Third-party service providers have become crucial to corporate success as their clients fight to stay on top of information technology developments. The push to embrace ebusiness has seen demand for consulting services skyrocket in recent years. Until now, providers of consulting, implementation, technology and other services have responded to increased demand by simply adding more and more staff to provide all-in-one solutions.

However, times are changing in the services industry. The growing complexity of ebusiness infrastructures, compounded by increasingly complex business relationships, has forced many of the largest service providers to reassess and restructure their core businesses. It's a revolutionary phase in the development of the services market, and one that will force many businesses to reassess the strategy they use to source and manage external service providers.

The need for change has been particularly pressing in conventional hardware markets, where system providers used to make respectable, if not massive, profits on the configuration, supply and installation of PCs, servers, networks and the like. However, as hardware providers increasingly bring these activities into their high-volume assembly process, customers have begun to value systems integrators less and less; indeed, many businesses now see these roles as obstructing their relationships with hardware suppliers.

"Customers are changing their view of how to purchase IT solutions," managing director of Brisbane-based Dat#3 John Grant said. Dat#3 is a longtime PC supplier that recently divided its business into four areas of specialty — enterprise solution services, technology integration services, managed services, and procurement services — to reorganise its 460 staff.

"If we don't bring our expertise into some well-defined areas, we're going to be out-engaged by the specialists," Grant continued. "Those four major lines of business cover much of what we already had in place, but pull together an integrated range of planning services. We're closer to the action, and closer to understanding the implementation issues, and if we can't outbid and outprice the larger organisations we deserve to lose."

The relationships between smaller and larger businesses aren't entirely adversar-

ial. Specialisation could improve prospects for subcontracting work under the auspices of major outsourcing contractors such as IBM Global Services, EDS and CSC. These contractors dominate major outsourcing tenders, but they will increasingly need qualified subcontractors to support their bids.

Kathy Beckman, senior analyst for services with IDC Australia, believes that partnerships with smaller niche providers will become important for supporting customers' increasingly complex requirements. "A lot of the providers are realising they can't do it all themselves," she explained, "so if they want to offer a whole service to a customer, they're going to have to partner with people that may sometimes be their competitors in other situations."

Handshaking like this doesn't always bring businesses closer. While companies such as Compaq struggle to combine hardware and services business, major services rivals are actually splitting off their IT consulting divisions in an attempt to extricate their services organisations from other core lines of business.

Constructing a wall between its services and product development divisions has been critical for CRM vendor SPL WorldGroup. Recently, it underwent a major restructuring where more than 200 consultants worldwide (including over 100 in Australia) split from the team responsible for developing its core CISPlus product.

SPL WorldGroup will now focus on product development, while the new WorldGroup Consulting services group has moved its worldwide headquarters from San Francisco to Sydney to reflect its predominantly Australian customer base. As a result of the split, general manager Stephen Bool expects the services organisation will rapidly grow to satisfy newfound customer demand. He anticipates taking on an additional 50 people by the end of the year, expanding the local group by 50%.

"We've got two businesses that are very successful in their own right, and growing very quickly," Bool said. "We came to realise they needed individual attention to realise their potential, and to be recognised as independent entities with separate value. This isn't an easy business — it's a difficult business, and if you do it



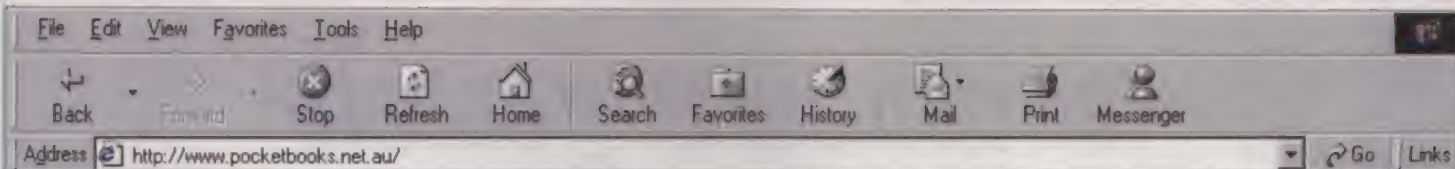
well you'll reap great rewards. But at the same time, you're undertaking much larger projects with risk, and that scares some companies who don't want to have that risk on their books. By separating the businesses, they each have completely different risk profiles."

The dramatic changes in the services industry have been driven as much by the companies' desires to expand their own businesses as by customer demand. The development of specialised competencies in different areas should create a wider variety of target organisations for companies wanting to expand in a specific direction.

Tapping into this new market will require a more mature approach to outsourcing. Multiple supplier relationships will have to be managed, and a way to apply consistent standards across the services those suppliers provide must be found. A recent survey by Forrester Research found that 68% of companies are extending internal processes outside their company, and that 60% of respondents will extend six or more business processes to external partners (these results are presented in the figure above).

In turn, 40% of the surveyed companies will call on outside help to manage these partners. This figure is up from less than a quarter of respondents last year. The market for Internet-based 'exSourcers', as Forrester calls them, will grow rapidly as businesses look for new ways to match their infrastructure and direction with the changes now taking place in the market.

David Braue



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The outsourcing debate

Outsourcing IT services continues to be a key strategy in managing costs and service delivery for large corporations, but the public sector is still resistant to the concept. Howard Dahdah examines some recent deals and controversies.

The argument in favour of outsourcing IT services is simple. By moving them to an external specialist, businesses can save money by exploiting economies of scale. They can also get better service by using dedicated experts. The argument against it is equally simple. IT contributes greatly to business advantage, and a remote service limits its capacity to drive business growth and reflect evolving business models.

Outsourcing remains controversial for many organisations, especially in the public sector, where quality of service is often deemed more important than profitability. Government agencies have had little choice but to outsource, under the Office of Asset Sales and IT Outsourcing's (OASITO's) pro-outsourcing policies. OASITO is the agency within the Department of Finance and Administration that looks after all the tenders in the government's IT outsourcing initiative.

Large corporations that prioritise profits have been happy to embrace outsourcing. Supporters claim that some degree of outsourcing is beneficial to every business. According to Michael Corbett, CEO of outsourcing consulting firm Michael F. Corbett & Associates, outsourcing has to be a part of the "repertoire" of every organisation if it wishes to make full use of its potential. He believes



pany shows that in the US, a significant proportion of corporate IT budgets goes into outsourcing. Currently, 24% of the IT budget is spent on outsourcing compared to 16% in 1998 the research found.

practice. "It's to help executives get smart on the topic," he said.

The new recruits

Corporate Australia continues to pursue outsourcing contracts with enthusiasm. One of the largest desktop PC service contracts in Australia was signed between Advantra and Telstra in July. Advantra (which is now owned entirely by Telstra), will assume responsibility for 50,000 of the carrier's computers. Advantra has not revealed how much the contract is worth, but it has boosted the company's overall profile in a single stroke.

The deal brings the number of desktop PCs serviced by Advantra to over 65,000, including the Group 5 government contract it was awarded early last year. Company officials have predicted that Advantra will have to "recruit heavily" in order to cope with the extra demand. In the last three years, Advantra's workforce has tripled to 1,500 staff.



Corbett: "I am not going to convince everyone that outsourcing is good. But it is a tool and it has to be in your toolkit."

that organisations should view outsourcing as just as important to their business strategy as the technology they use.

"I am not going to convince everyone that outsourcing is good. But it is a tool and it has to be in your toolkit. You have to know when and how to apply it," he told APC just prior to a visit to Australia for the inaugural Outsourcing Summit, which also saw the launch of a local branch of outsourcing advocacy group, the Outsourcing Research Council.

Research conducted by Corbett's com-

Similarly, outsourcing expenditure in Australia is expected to reach \$US250 billion, up from \$US195 billion in 1999, according to consulting firm Dun & Bradstreet's Global Barometer.

According to Corbett, investors and shareholders only want to see a return on their investment. Whether a company owns the nuts and bolts of every aspect of the business is irrelevant.

In Corbett's current role as CEO, he ensures that senior company executives focus on outsourcing as a management

One deal currently underway shows the high value placed on outsourced services. The Commonwealth Bank looks set to hand over a \$500 million telecommunications outsourcing contract to a consortium led by Telecom New Zealand (TNZ).

The bank announced in late July that it was in the final stages of negotiations of a five-year contract with TCNZ Australia (TCNZA), a wholly owned subsidiary of Telecom New Zealand. TCNZA heads a consortium which also includes Australia's third-largest telco, the TNZ-owned AAPT, as well as Com Tech and the Commonwealth's existing IT outsourcing provider, EDS. What might also seal the deal is the fact that the carrier has an IT services outsourcing contract with EDS.

Russell Scrimshaw, head of the bank's technology, operations and property division, said the telco contract will reinforce its online campaign. The contract is expected to deliver a range of integrated voice, data and video capabilities over IP networks. There are also provisions for remote access, telecommunications consulting, and risk, security and performance management. According to Scrimshaw, this agreement will increase the bank's competitive edge through the application of leading technology.

The Commonwealth Bank is no newcomer to big outsourcing contracts. It signed a 10-year agreement with EDS in 1997. An interim management arrangement was included, so that the bank could review its telecommunications arrangements within that contract.

"The intention of the telecommunications review was to identify a partner that will enhance the bank's telecommunications services, provide flexibility and reinforce its leadership in online financial services," Scrimshaw said. According to Scrimshaw, the existing partnership with EDS provides a 20% cost saving each year. He said a similar cost saving is expected with TNZ through its provision of telecommunications services.

Scrimshaw said that the Commonwealth Bank will not invest in the telco as it did in EDS in 1997. EDS was a relatively new entrant in the Australian marketplace, but TNZ is too "well ensconced" in the market to be considered by the bank.

According to Martin Freeth, TNZ financial and communications manager, the deal is a "major step" for the telco, which beat both Optus and Telstra in the tender process. He said that this is the telco's first supercorporate contract in the Australian marketplace. As yet, no time has been set for an official announcement by the bank.

TNZ's ability to fulfil the infrastructure requirements of Australian clients comes primarily from its acquisition of AAPT. In recent months, AAPT and TNZ have won several business contracts, representing a total annual revenue of \$6 million.

These contracts include the New Zealand-based forest, building and paper products company Carter Holt Harvey, food group Heinz Wattie's Australasia, and transport and logistics company Owens Group. In the government sector, AAPT has provided services for both the Victorian and South Australian governments.

The opponents

Debate over outsourcing becomes heated in areas where control of IT has a direct impact on outcomes. In one recent, highly publicised case, government science body the CSIRO spoke out against the government's plans to outsource its IT infrastructure, fearing that outsourcing will compromise the organisation's capacity for "world-class science".

According to Dr Pauline Gallagher, the CSIRO staff association assistant secretary with the Community and Public Sector Union, outsourcing "does not make business sense". She said that jobs will be lost, research efforts will be undermined and

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costs will be greater if outside contractors manage the CSIRO's IT.

The government "is interfering with the tools of research", she told APC. "In the CSIRO, IT staff are very science literate and interact closely with research colleagues every day. It would be impossible for an outside contractor to step in and take over this role without jeopardising the CSIRO's research work," she said.

OASITO is still unsure of the details of its contract for the Group 9 science project, of which the CSIRO is a member. Other agencies in Group 9 include the Australian Nuclear Science and Technology Organisation, the Bureau of Meteorology and the Australian Antarctic Division.

According to Gallagher, attempts by the CSIRO to meet with the ministers for science and the environment, who have the power to exempt it from the outsourcing contract, have so far proved unsuccessful. She said it is imperative that the CSIRO meets them before the tender contract is drawn up, as once it is covered by contract law, it cannot be reversed.

Gallagher said that in many cases the work undertaken by the CSIRO is unique. "It requires extensive knowledge of systems, instrumentation and the research being undertaken. The CSIRO is often involved in

remote fieldwork on land, sea and in the air, and the quality and cost effectiveness of contract support in those environments is completely unknown," she said.

A similar concern has been expressed by Jorgen Jensen, the senior research scientist in the CSIRO's atmospheric division. His division is responsible for sending out aircraft with scientists who conduct tests on clouds, radiation, wind, humidity and greenhouse gases. When scientists go into the sky, they take their computers (which have unique configurations and applications running on them) with them. These are the same computers that operate in their labs. "If they take them away from us, we can't go into the field," he said. "As scientists, we have a very high interest in ensuring that whatever is going to be done by OASITO will not affect our work."

Determination

Finance and Administration minister John Fahey, has few doubts about outsourcing. "It has taken time and a compelling argument to overcome suspicions about the private sector as a bona fide service provider," he said at the Australian Outsourcing Summit. "However, agencies

have realised a range of functions are better performed by organisations outside the government." According to Fahey, outsourcing has challenged the way the government shapes its business.

Auditor-General Pat Barrett has dismissed suggestions from a large outsourcing firm that the Australian National Audit Office is "looking for the worst" in its report on the Commonwealth's IT outsourcing initiative, due for publication later this year.

Speaking at the Australian Corporate Lawyers Association/Australian Institute of Administrative Law Conference on Outsourcing in Canberra, Barrett said that the Auditor-General's Department will table the report this month.

In the report, the administrative and financial effectiveness of the government's IT outsourcing will be assessed. This includes assessing the tendering, contracting and monitoring processes undertaken to date. Barrett said that the risks outsourcing can bring to an organisation should not be ignored. "The experience of my office has been that a poorly managed outsourcing approach can result in higher costs, wasted resources, impaired performance and considerable public concern." ■



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Bridging the divide

If you read 'The Digital Divide' in the August edition of APC (see page 68), you'll know that although Internet access may be essential for participating in the society of the near future, the gap between the bandwidth haves and have-nots is widening. The problem is already being felt in regional and remote areas of Australia. These communities often incur long-distance charges to connect to the closest Internet service provider.

Solving the world's socio-economic problems is a little beyond the scope of Workshop, but this month's Just DIY, which is about setting up a low-cost, community-based ISP, could be prophetic. The community that is the subject of this story started its own modest ISP for less than \$1,500, and gave itself a valuable education in the process. Admittedly, this community isn't economically, technically or educationally impoverished, nor is it particularly remote. The bandwidth the ISP provides is only a trickle compared to that available to city dwellers, but a similar model could be used very effectively in remote areas of Australia where obstacles to Internet access are greater. However, there's still the question of bandwidth charges.



Hopefully, if some of the bigger fish in Australia's telecommunications pond are as sincere in their desire to resurrect their images as their ad campaigns suggest, there's a chance (a very slim one) that bandwidth costs won't ever become an issue. Perhaps a PR agency will find some clarity amid the white noise of product launches and media releases, and suggest that their clients support projects like these with sizeable bandwidth donations. There might even be a Federal Government minister or two who will see the political value of such a gesture.

All of our other regular columns are equally informative. Practical Java shows you how to debug those applets that you spent countless hours creating.

Insite demonstrates the power and versatility of ASP, and Technobabble continues to demystify the innards of the beige box. For more details on this month's columns, refer to the Workshop contents list.

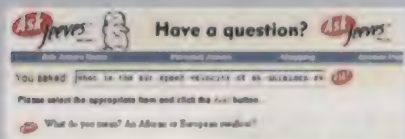
Andrew Colley, Workshop coordinator

Workshop invites your contributions.

Please send your ideas, comments or criticisms to workshop@acptech.net, or to our snail mail address: APC Workshop, PO Box 4088, Sydney NSW 1028.

Bug of the month

Does Jeeves have a sense of humour? Okay, I admit it, it's not really a bug, but when Pythonesque reader Thomas Baxter submitted this to Bug of the month, I couldn't resist awarding him the prize. Thomas asked the Ask Jeeves search engine that deep philosophical question: 'What is the airspeed velocity of an unladen swallow?'



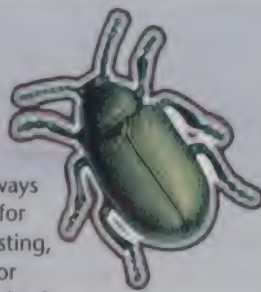
If younger readers don't understand this, it's time you rented *Monty Python and the Holy Grail*.

Win! Win! Win!

Workshop is always on the lookout for the most interesting, strange, funny or downright weird software bugs you can find.

Send us your favourite bug via email to bugs@acptech.net or snail mail to APC Bug of the month, PO Box 4088, Sydney NSW 1028, and you'll be in the running to win a one-year subscription to APC. Please send screen captures, example code listings or detailed instructions to trigger a bug in an application, as appropriate for your entry.

Michael Smith



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Concluding our series on storage, Technobabble examines the mysteries of the hard drive.

Hard act to follow

If you've ever worked in computer support, or been the person that everyone else in the office or house asks for computer advice, you'll be aware that general comprehension of the hard drive is poor. There's a strong misconception that the system case is the hard drive. Of course, this isn't correct, but it is understandable; the system case is solid and all the drives (floppy, CD and hard drives) are located within it. To conclude our series on storage, Technobabble looks at the hard drive.

Step up from the floppy age

Two months ago we looked at what makes floppy drives tick. Actually, if they're ticking, they're probably faulty, but I digress. Floppy disks are good at small-scale storage but they have size limitations. This is where non-removable storage media (hard drives) come in.

Hard drives are composed of a series of platters onto which a magnetic substrate is placed, in much the same way as a floppy drive. Indeed, the first hard drives were basically floppies with larger capacities, and the drive heads worked directly on the platters themselves. However, this approach had its problems.

Like an LP record, heavy usage eventually wears out the grooves on the platters. Imagine playing the same LP 24 hours a day, and at several thousand times the recommended 33rpm. Wear and tear was a big problem with hard drives until the breakthrough that changed hard disk drives was made: the floating head. Hard drive heads now float above the magnetic substrate, reading the magnetic impulses picked up from it.

Floating heads?

Yes, floating. The drive head floats as close to the drive platter as possible, without coming into contact with it. There are considerable advantages to having the drive head as close to the platter as possible, and most of them have to do with the capacity of the drive. To use an analogy, imagine you're on board an aeroplane. If you look out of the window while in flight you can see houses, but you can't make out any

details. The closer you get to the ground the more data (cars, people) you can see. Hard drives work in a similar way. If the drive head touches the platter it crashes, just as our metaphorical aeroplane would if it got too close to the ground.

Most modern hard drive heads fly only microinches (millionths of an inch) above the platter, and most drives have a defined landing zone (often called the parking area) for the heads to spin down onto in the event of power loss. It used to be quite common for PCs to include a dedicated parking command for hard drives, but all new machines do this automatically.

Each hard drive consists of a series of platters made of aluminium or a special type of ceramic glass. An individual hard



drive can have as many platters as can fit into it; each additional platter means greater potential space. The platters run from a central spindle that spins around according to the rated speed of the drive.

Platter geometry is often misunderstood, mainly because most people struggle with the concepts of cylinders, heads and sectors.

Cylinders, heads and sectors

The substrate placed onto each platter has a set number of tracks on it. The reading head mechanism uses the tracks to locate data on the substrate.

Tracks are simple, just as they are on floppy disks. The big challenge is to put as much data into as small a space as possible. There are limits to the amount of data you can put on to a single disk, which is why hard disks use platters of disks that are stacked on top of each other and work from a central spindle. This is where cylinders come in.

Each drive has a large number of platters, and each platter requires a read head to take advantage of the extra space provided by the platters. All of the read heads need to be aligned perfectly under each other — it would be poor organisation to have a certain area of data start at track zero on platter one and track 342 on platter two. With aligned read/write heads it's possible to track and place data more accurately, using what are referred to as cylinders. Cylinders are parallel tracks on different platters. All the number zero tracks across a range of platters make up one cylinder, as do all the track 342 areas.

Tracks can hold a lot of data, and for this reason they're subdivided into sectors. Each sector on a hard drive can hold 512 bytes (not including error-checking areas). A hard drive can be described to a system in terms of CHS (cylinders, heads, sectors). The number of heads will always be equal to the number of platters, and in the same way, the number of cylinders will always be equal to the number of tracks per platter.

It's not important on modern systems to actually know the CHS setting for your drive — unless something goes wrong. While most system BIOSes will read the settings straight from your drive correctly, older systems (and newer ones with flaky BIOSes) can and will stuff up. However, with the facility to enter these settings manually, you can force your system to recognise any drive.

Drive speeds

Last month, when looking at CD-ROM drives, we introduced the concepts of Constant Angular Velocity (CAV) and Constant Linear Velocity (CLV). CAV uses a system for any tracked surface where the rotational speed is the same at the centre



of the disk as it is at the outer edges (meaning more data can be read at the outside as the head travels further), while CLV alters drive speed settings to maintain a constant data rate, no matter where you happen to be reading on the disk.

Most hard drives utilise CAV, mainly because it's quite difficult (and potentially time consuming) to accelerate and decelerate the drive heads, especially when you consider that they're floating over the platters.

CAV technology is fine, but there's a problem with it. If the number of bits on the inner edge tracks is the same as the number at the outer edge, the drive will waste an awful lot of space. The trick to overcoming this lies in recording in zones. This is called *zone bit recording*. The tracks towards the outside edges (which are longer) are packed more tightly with sectors, while the inner tracks (shorter) have lower sector densities.

Zone bit recording emulates some of the features of CLV systems. The heads don't actually change speed, but they cover more data on the outer tracks, achieving the same effect. The physical differences of the inner and outer tracks are exploited to improve drive capacity and performance.

Data patterns

It would be good to be able to say that the absence or presence of a magnetic impulse equals the data bits that get read on a given pass, but it's rather more complicated than this. First, it's not presence or absence of magnetic impulse that is measured by a hard drive head, it's changes in polarity. If you've ever played around with magnets, you'll know that they have two opposite poles, which are commonly referred to as north and south, or positive and negative. Magnetic

energy moves between these two poles, and it's the direction that the energy travels that is measured by the heads.

This doesn't mean that a north/south charge is a one and a south/north charge is a zero. Imagine, for example, that you had a whole field of zero values, all of which were represented by a south/north charge. The read head of the hard drive would pass over the field of zero values in a flash, but apart from registering where the first positive (the start of your values) was, and where the next positive (the end) was, there's no way for it to measure the number of zero values it passes over easily and accurately. This is where encoding modulation comes in.

The first type of encoding modulation was frequency modulation, where a polarity change was measured by putting another polarity change after it as a clock synchronisation device. Consequently, you'd get a pattern of north/south change (a 'one') followed by a further north/south change to tell the read head that it was indeed a 'one' that it just passed over.

Frequency modulation has a huge overhead, of course, and has been superseded by methods such as RLL, which uses preset algorithm patterns to define areas based on polarity, as well as predictive methods such as PRML, which deduces likely bit patterns as a form of read correction.

Next month, we'll continue our exploration of the hard disk. We'll look in more depth at platters and the technologies used to keep heads reading at maximum pace. We'll also look at what hard drive speeds really mean, the IDE/SCSI war and, as they say, 'much, much more'.

Alex Kidman

A question of size

If you look at the quoted size of any hard drive in the advertisements in this month's magazine, it'll probably be false. Not that we're casting aspersions on the integrity of our advertisers; it's just that your computer might find the quoted sizes a little debatable.


You may, for example, have bought what you thought was a 3.2G drive. However, if you look at it as your operating system does, you'll find it being reported as a 3G drive. Where did the 0.2G go? Well, in most cases, nowhere — as far as your system is concerned it never existed. Confused? If you've been reading this column for the past couple of months, it might be a bit clearer.

There are basically two ways of determining the size of a quantity of data: decimal or binary notation. A *decimal* kilobyte is 10 to the power of three bytes, or 1,000 bytes. A *binary* kilobyte, on the other hand, is two to the power of 10, or 1,024 bytes, and it's the binary measurement that your system cares about.

The mission of marketing departments is to make their products look as impressive as possible. Therefore, it's not surprising to find that they prefer to describe their binary-sized drives in decimal terms, as it makes the drive seem bigger than it actually is. A difference of 24 bytes might not seem like much between friends, but the differences become more marked as you increase the scale on which the unit is used. A decimal gigabyte, for example, is 1,000,000 bytes, but in binary notation, it's 1,073,741,824 bytes.

If all this seems like double-dutch to you, don't worry. Using the example above, if the drive contains 1,073,741,824 bytes, it's a one-binary gigabyte drive. However, a one-decimal gigabyte drive has 1,000,000 bytes on it, so your 1G (binary) drive can be described as a 1.07G (decimal) drive. Of course, most manufacturers leave out the decimal bit, as it wouldn't help sales.

 Alex Kidman can be contacted at alexk@acptech.net

 For a complete archive of APC Technobabble columns, see apcmag.com.

Bamboozled by jargon? We translate all the latest buzzwords for you.

What's new in 3D?

We first covered 3D graphics in the Technobabble column of our December 1998 issue. A lot has happened in the 3D graphics market since, and this month we'll fill you in on all the latest buzzwords. If you're looking for some background, the 1998 article can be found on our Web site at apcmag.com or on this month's cover CD.

Transform and lighting

In 1998, transform and lighting (T&L) was just a curiosity, only available in certain workstation OpenGL graphics accelerators. Now several newer consumer cards support it and many more manufacturers plan to.

3D graphics are generated in two stages: lighting/geometry (setting up the 'wire-frame' view of the scene) and rendering ('painting' that scene). The former was generally the domain of the computer CPU, the latter the task of the graphics card. New cards take the geometry transform and lighting stage and perform those calculations in hardware, relieving the CPU of a

otherwise flat surface. For example, it can be used to give a wall texture by creating the illusion of bumps and pits on the surface. Creating such minute detail with geometry would be prohibitively slow, but the use of bump mapping allows it to be done with little loss of performance.

Various cards support the feature in a variety of ways. Some use methods called embossing, dot product or environmental bump mapping, but the fundamental goal is the same: to use tricks of light and colour to give objects a realistic texture, instead of the unreal smoothness normally seen in 3D graphics.

Texture compression

Texture compression is supported by the majority of new cards. Currently, boards are limited by memory and bandwidth, and one way of negotiating these limitations is to take the textures (the images used to 'paint' the 3D scene) and compress them as you would any other image. This means that highly detailed

Diagonal lines on computers look horrible: the square pixels create a stepping effect known as aliasing.

substantial burden. The custom circuits of these boards generally perform the calculations much more quickly than the host CPU, allowing far greater detail in the scenes, so that curves look curvier and objects appear less faceted.

However, game developers have been slow to take up this technology. Very few games take advantage of the hardware and its ability to push geometry transform to new levels. Cards like the nVidia GeForce and ATI Radeon can perform these functions, but are rarely called upon to do so. This is about to change because many upcoming games will support the feature and will be able to modify their level of detail, depending on the card in the system. It's a common design approach now to build scalable applications that adjust what they try to put on the screen according to the hardware resources available.

Bump mapping

Bump mapping is a technique that uses overlays to create an illusion of 3D on an

and varied textures can be used, creating more realistic-looking objects, especially up close.

Texture compression/decompression must be supported in hardware to be practical to use. CPU-based decompression of textures generally creates an unacceptable processing overhead that reduces overall performance.

There are several algorithms for compressing textures, but the most widely adopted one is DXTC (DirectX texture compression), a technique developed by S3 and adopted by Microsoft as the 'official' texture compression system for its DirectX API.

Full-scene anti-aliasing

As anybody who has worked with computer graphics knows, diagonal lines on computers look horrible: the square pixels create a stepping effect. This is known as aliasing. It's particularly noticeable in 3D scenes, at the edges of textured objects. Very thin objects (like a pole in

DirectX and OpenGL

Application programming interfaces (APIs) save developers from reinventing the wheel every time they need to build an application. The 3D APIs allow developers to skip through the basic stuff common to all 3D applications (for example, texturing and geometry transform) and concentrate on higher development tasks. More importantly, they provide a level of hardware abstraction so that developers don't have to recompile the same code for every graphics chip. The APIs take the generic code and translate it into hardware-specific calls.

There are numerous APIs for 3D graphics. However, only two have had much attention from games developers in the last year: DirectX and OpenGL. Glide, once a serious competitor, has all but disappeared as 3dfx's graphics card market share has waned.

OpenGL, originally developed by SGI, is now a semi-open standard. This means that licensing requirements must be met before a developer can use the OpenGL brand. It was developed for use in industrial visualisation and CAD applications, but has since been applied to games. It's well engineered and well supported by graphics card vendors. It is also able to take advantage of the hardware features of cards more effectively than early versions of DirectX.

Early versions of Direct3D (the 3D component of DirectX) were poor in terms of features and application. Many developers disliked Direct3D prior to version 6, but marketing and pressure from Microsoft meant it continued to be used. A few developers — most notably Quake developers id Software — used OpenGL.

With the release of versions 6, 7, and soon 8, DirectX is reaching feature parity with OpenGL, but developers are still divided as to API preference. Programming style and ease of access account more often for these preferences than specific features of the APIs.

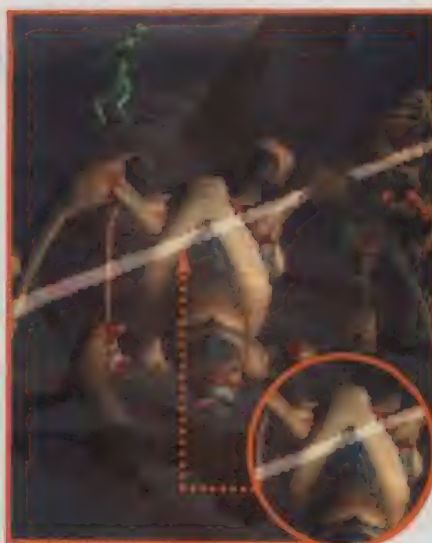
When developers use these APIs, they usually only use the bare bones. For example, Direct3D is broken into two parts: a media layer and a retained mode. The former provides simple translation between generic 3D commands and hardware-specific instructions. The latter is almost a 3D engine in itself, and includes things such as geometry transform routines, lighting and animation. Lots of developers use the media layer, but develop their own engine on top of that layer (this is largely a consequence of the poor early implementations of DirectX). OpenGL is generally used in similar ways.

A consequence is that many consumers are confused about support for different hardware. DirectX 7 supports T&L, so why can't any game using DirectX 7 make use of the T&L features of their high-powered graphics card? This is because the developers use only the media layer and develop their own engine that doesn't support T&L. Vast improvements in the APIs mean that more developers will start to use them more fully, taking advantage of all the hardware has to offer.

the distance, for instance) can also cause problems, popping into and out of existence because the system can't decide whether or not they warrant having pixels devoted to them.

The simple solution is to run the scene at a higher resolution. The human eye can't detect aliasing (jaggies) when the pixel size is very small. Another solution is anti-aliasing, which reduces the contrast between an edge and the object behind it, in effect blurring the scene. This works only on the edges of objects, so it doesn't reduce problems with stepping on textures, for instance.

A number of newer cards support what is called full-scene anti-aliasing (FSAA), where every pixel in a scene is affected by the pixels surrounding it. In most instances, the scene is rendered at a much higher resolution and adjusted to fit the current resolution. Obviously, this has enormous performance disadvantages (it's like running at four times the resolution), and in most cases you might as well just run the graphics card at a higher resolution. A GeForce running at



▲ The difference between normal and anti-aliased scenes. The picture on the left demonstrates 'jaggies'. The anti-aliased picture on the right demonstrates some slight blurring (an inevitable result of anti-aliasing), but the jagged edges are less noticeable. Both shots are at the same resolution.

1,280 by 1,024 without FSAA looks better than the card running at 640 by 480 with it, and the performance is likely to be about the same.

3dfx uses a different method for FSAA. The T-Buffer reputedly uses fewer resources than most other cards, but causes a serious performance hit nevertheless.

Motion blur

Another technology invented to solve a problem for which simple solutions already exist is motion blur. Even when running at relatively high frame rates, games can look jerky. Unlike film, which has motion blurred movements between frames, each frame in a 3D sequence is discrete, so it rarely looks natural. You don't get 'speed lines' from fast movement or panning in 3D.

Move your hand quickly in front of your face: notice how the hand appears to be blurred between movement points. This is how our brain interprets 'frames' received through the eyes. Computers don't provide that blurring, and it's this that makes 3D scenes look unnatural. One solution is to introduce the blurring artificially by stretching and fading moving objects in a scene, and there are a few cards that can do this in hardware.

Motion blurring becomes unnecessary once frames rates pass 60. The brain starts to interpolate frames independently at this point, rendering artificial motion blur redundant. Cards are now advanced enough to deliver those rates, so the addi-

tion of motion blur to a graphics card seems superfluous.

Video decompression

Decompressing DVD video used to require a dedicated MPEG-2 decoder, but it's now possible to do it without one. Most current CPUs are fast enough to give adequate playback performance, but if you want really high quality you need a dedicated card or a graphics card with a chip that has a lot of the functions of the dedicated card. The latter will take the lion's share of work from the CPU, and give you the kind of quality seen in a standalone consumer DVD player.

The degree to which cards support DVD decoding varies. Some only take parts of the decompression process from the CPU. Others take the majority. They all boast of DVD playback in their marketing materials.

It's hard to tell which ones have real hardware decoding circuitry and which ones just pay lip service to DVD playback without really offering anything that improves the playback of movies. Most cards support scaling and motion compensation (two facets of decompression), but cards that also support inverse discrete cosine transformation (iDCT) are best equipped take the load off the CPU. ATI's Radeon and Rage 128 cards are probably the best known graphics cards for DVD decompression.

Nathan Taylor



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For a complete archive of APC Core columns, see apcmag.com.

In the beginning...

Plan an ebusiness, explore MP3s and do just about everything with your handheld PC.

The Internet Start-Up Bible

The inspiration for this book came from a survey of private equity investors in the UK who revealed that the majority of ebusiness plans they receive are crude and lack sufficient detail and thought.

The authors take a very simplistic approach to building an online business. The book focuses on providing breadth of information rather than depth, but in doing so, treats important issues too superficially. For example, its chapter on human resources contains little more than a page on how to manage staff. This cursory treatment of complex matters is *The Internet Start-Up Bible's* main failing. It would have been better

to omit these subjects rather than pay them such superficial attention.

That said, the book contains some useful information for those venturing

into the online world. For example, there is a chapter on the various funding options including business angels and archangels, venture capital, private equity, incubators, corporate investors and others.

The Internet Start-Up Bible is published in the UK, so some of the information and most of the resources are specific to that country, and will not be relevant to Australian readers.

This book is similar to those in the Dummies series. It really is for people just beginning to dip their toes into the online world; anyone with a foot already in will find it of little use.

Cathie Kennedy

Authors Tess Read, Calum Chase and Simon Rowe
Publisher Random House Business Books
Contact Random House
Phone (02) 9954 9966
Price \$26.90
ISBN 0712669663
Rating ■■■■■■■■

MP3 The Definitive Guide

This book will provide most readers with more than they'll ever want to know about MP3 audio.

The breadth of coverage is impressive. In addition to descriptions of creation and playback software for Windows, Linux, Mac OS and BeOS, you'll find notes on MP3 broadcasting as well as discussions of the legal and audio quality issues involved in making the best use of MP3 files. You wouldn't want to take this book as gospel when it comes to the law, as it's US-based, but it's a reasonable starting point.

The author addresses issues such as selecting appropriate hardware, choosing the best encoder and setting encoding parameters to optimise sound quality.

Coverage isn't restricted to computers. Hacker also reviews portable MP3 players and looks at automotive and lounge room installations, including some DIY hints.

The book's binding allows it to remain open without breaking the spine or having to weigh down the pages. The design is very clean. The use of good quality stock helps as well, but it comes at a price.

This is a worthwhile book, but it needs a more consistent approach to identifying programs as commercial, shareware or freeware and stating their prices. The coverage of Mac OS issues is patchy.

Anyone seeking high-quality MP3 audio will be well served by Hacker's work, but passive consumers of MP3 downloads will not find it such good value.

Stephen Withers

Author Scot Hacker
Publisher O'Reilly & Associates
Contact Woodslane
Phone (02) 9970 5111
Price \$65.86
ISBN 1565926617
Rating ■■■■■■■■

How to do everything with your Pocket PC and Handheld PC

How to do everything with your Pocket PC and Handheld PC won't tell you how to build nuclear missiles with your handheld device or clean that little patch behind the loo — it'll just tell you how best to use the capabilities of machines running Windows CE or Pocket PC.

The first chapters cover why you should use a handheld system, but they read more like an ad for Microsoft's various portable Windows solutions. The author also writes for a Windows CE magazine, so it isn't surprising that the Palm alternative isn't given much attention.

The rest of the book covers most common Windows CE applications, with occasional references to Pocket PC applications. The book is well laid out, with plenty of screenshots.

Overall, the book is a reasonable, if simplistic, guide to Windows-powered PDAs. It's not as detailed as it could be, and tends to focus on explaining concepts that are really self-explanatory. This is inappropriate for the PDA crowd, who are likely to be computer literate already.

Alex Kidman

Author Frank McPherson
Publisher Osborne
Contact McGraw Hill
Phone (02) 9415 9899
ISBN 0072124202
Price \$42.96
Rating ■■■■■■■■

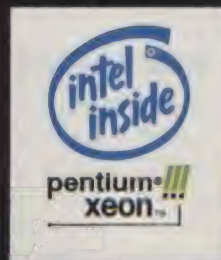
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I can see clearly now

If you're using an ordinary cathode-ray tube (CRT) monitor, there are two settings that make a big difference to how good the image looks.

Monitor resolution

Lots of monitors these days can accept a very high resolution input signal. Low-cost 17in monitors capable of resolutions of 1,600 by 1,200 and higher are common. It's nice to have these super-resolution modes, but just because a monitor can display a given resolution doesn't mean it can display it clearly.

Your monitor's display is made up of lots of tiny red, green and blue phosphor dots that can display any colour if they're lit up appropriately. The maximum resolution a monitor can display clearly is determined by the size and arrangement of the dots. Monitor specifications include a *pitch* number. The pitch tells you the distance between dots of the same colour, and is expressed as a fraction of a millimetre. Well, that's what it's supposed to tell you, anyway.

Most monitors use the *shadow mask* design, where dots are arranged in a hexagonal pattern. The most common arrangement is shown in the close-up below.

This is part of the screen of a 19in monitor running at 1,280 by 960. It is specified as a 0.22mm dot pitch unit, but this figure is the *horizontal* dot pitch: the horizontal distance between dots of identical colours. However, the hexagonal arrangement means you can't actually get from one dot to any of its nearest neighbours of the same colour just by moving horizontally; there's a vertical component as well. The *real* dot pitch is 0.25mm.



The dimensions of the standard Windows mouse pointer in the picture are 19 by 11 pixels. Analysing just the height, the pointer covers 41 dot-rows.

The minimum full-colour rendering unit on the monitor isn't an individual dot, because each dot can only show one of the three primary colours. You need three dots in a triangle — or 'triad' — to get full colour.

Because the rectangular pixels of the image don't map neatly on to the tightly packed dot triads, it's impossible to display as many pixels as you have triads clearly. Exactly how many pixels you can display clearly depends on your exact definition of the word clear, but generally it's about three-quarters to four-fifths of the number a simple calculation of the number of triads would give.

Each triad is two rows high, so in this example there are 20.5 triad-rows to cover the 19-pixel-high pointer. Apply the three-quarters rule and you can see that 25 triad-rows would be better, but this isn't too bad.

About the highest resolution that this monitor can effectively display is 1,280 by 960. A resolution of 1,280 by 1,024 has less than 7% more pixels and so will look much the same, but 1,600 by 1,200 is well over the top.

In Sony Trinitron, Mitsubishi Diamondtron and other *aperture grille* monitors, the dots are actually vertical stripes, with less space between them and quite different horizontal and vertical spacing, as shown in the close-up above.

This picture also shows the shadow of a *dampener wire* — a supporting wire that keeps the many vertical wires of the grille stable.

You can roughly compare stripe-pitch figures with dot-pitch ones by adding about 15% to the stripe pitch.

Mass-market monitors these days have dot pitch specs that vary between about 0.29 and 0.20mm, but the smallest pitch ones often quote horizontal pitch, overstating their quality.

A genuine 0.20mm 17in screen can manage 1,280 by 960 clearly. However, generally speaking, 800 by



600 is the highest resolution a 15in screen can display clearly, 1,024 by 768 is the maximum for a 17in monitor, and a 19in monitor can handle 1,280 by 960. Only 21in monitors with a low dot pitch can manage 1,600 by 1,200 clearly.

Flicker fixing

The second, and less obvious, monitor setting is its refresh rate. This is the number of times per second that the screen image is redrawn. If the refresh rate is too slow the image will flicker.

Most people notice flicker if the refresh rate is below about 70Hz (redraws per second). Video cards default to a 60Hz refresh rate after you install them, to make sure they'll work with whichever monitor you're using. Flickering is quite obvious at 60Hz.

The point where noticeable flicker goes away is generally understood to be 72Hz, but different people have different opinions. Most people find that 75Hz is good enough, 85Hz might be a bit better, but anything greater won't make a visible difference.

Many older monitors deal with high refresh rates by using interlaced mode — drawing only every second line, then filling in the gaps on the next redraw. This is a poor solution. A refresh rate of 100Hz interlaced generally looks better than 50Hz non-interlaced, but the result is still poor. If you've got an old interlaced monitor, you should seriously consider upgrading.

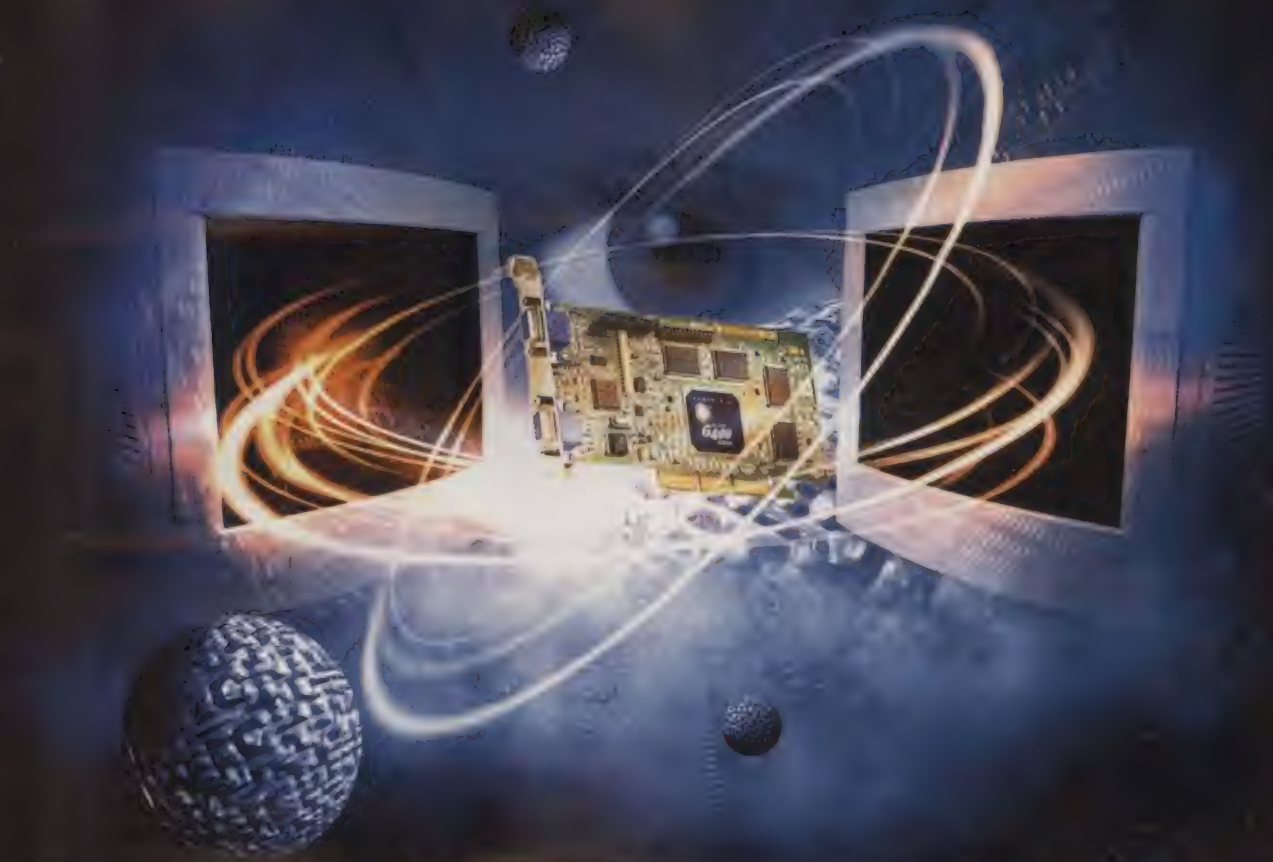
Daniel Rutter



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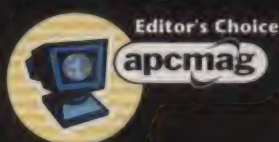
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How a neighbourhood harnessed community spirit to build its own ISP.

Connections in the community

Browsing through the local paper, an article appealing for people interested in setting up a community-based ISP caught my eye. The project aimed to build a low-cost public access ISP to deliver cheap Internet access to members of the local community, and allow them to play an active part in its setup and maintenance.

As a Linux user of two years and an active member of the open source community, I saw this as the perfect opportunity to promote the virtues of Linux.

Linux who?

At the group's first meeting, I suggested running the ISP on a Linux-based server, but this was met with blank faces. The project organisers suggested running a Windows NT system, but I managed to convince the group that NT was too costly and not in keeping with the spirit of the project. A decision was made: the system would run on Linux. I would set up and administer the server, and eventually show the others how to use it.

Hard up

The first task was to acquire a suitable system for a reasonable price. One of the group members had donated an almost complete computer — all we needed was a processor, some RAM and a hard drive. A few modems, an Ethernet hub, two network cards, a multiport serial card and 16-port board would complete our hardware setup. The multiport card and board would enable us to attach the modems to the server and would also provide an upgrade path for the future.

We managed to buy the processor and RAM second-hand at a computer fair; the hard drive and hub were bought at cost price from a computer shop, and eight 33.6Kbps modems were purchased from another regional hub that had recently upgraded to 56K modems. We also managed to get our hands on a second-hand Cyclom-YeP (www.cyclades.com) serial port board and host card from the classifieds. The only components missing were the network cards, which I donated.

It took a couple of weeks of bargain hunting to gather everything we needed,

but the money we saved made it well worth it. For about \$1,100 we managed to get all the hardware we needed to build a fully functioning server.

Hot wired

Next, we had to figure out where to locate the system. With very few options open to us, we decided to set up the hub at the home of one of the group members.

Setting up the hardware was straightforward, except for one small problem. The CD-ROM drive would not fit into its slot with all four RAM SIMMs installed. It

Hardware costs

Pentium 200	\$130
128M RAM	\$70
4.3G hard disk drive	\$220
Eight 33.6Kbps modems	\$400
Eight-port hub	\$80
Cyclades card and board	\$200
Total	\$1,100

Note: these prices are estimates.

was easily fixed; a minor modification to the case allowed the positions of the hard disk and CD-ROM drive to be reversed.

After recompiling the kernel a few times to add support for the new hardware, the system was running smoothly. However, for the first week or so of its life it was only running on 64M of RAM — not its 128M capacity (a well-documented 'feature' of LILO). Enabling the full 128M was a simple matter of adding the following line to `lilo.conf`.

```
append="mem=128M"
```

The software package

I used Red Hat 5.1 because it is the easiest Linux distribution to use, and other people would have to administer the server in the future. Another benefit is that the standard Red Hat distribution comes with applications that saved me a lot of time and effort when administering the server.

First, I needed to add more than 30 users to the system. I created a file containing the usernames and wrote a simple shell script to run the `acua_addUser` script from ACUA (see the program description below) for each name in the file. I used this particular script because it sets up the required ACUA information and adds the user to the system at the same time.

The following programs were needed to allow users basic Internet access. Apart from `mgetty` and `Samba`, all the programs were compiled from the latest source tarballs.

mgetty (alpha.greenie.net/mgetty)

When a user dials in, `mgetty` answers the modem and sets up the link, ready for information to be sent across the wire. `mgetty` is similar in function to standard 'getty', which is used to facilitate the login program on most Linux consoles and is fairly simple in terms of configuration. All I needed to do was make a few changes to `mgetty`'s configuration file for the local system and add the following configuration line for each modem to `/etc/inittab`, to start `mgetty` on the specified serial port at startup.

```
c0:3:respawn:/usr/sbin/mgetty ttyC0
```

`mgetty` also includes a particularly useful option, called `AutoPPP`, which automatically authenticates the user and initiates PPP (Point-to-Point Protocol). By using `AutoPPP`, Windows 95/98 users could connect without having to use a script.

ACUA (acua.ebbs.com.au)

This is an account and administration program for simplifying access to the server. When PPP starts, ACUA is called via the `ip-up` script that is run whenever a PPP link goes up. As the client accounts were unlimited and expired after one year, all I had to do was configure the continuous block of time users could spend online. ACUA would only disconnect users after a specified time frame if all of the modems were full, unlike most commercial ISPs, which disconnect you regardless of how busy the lines are.

ACUA was probably one of the most difficult programs to grasp, and because it

wasn't widely used at the time there was little information available to help work through problems. Fortunately, the source code was available.

pppd

On the client side, pppd is standard for practically all Linux users accessing the Internet, though setting it up on the server side requires some configuration. PPP is started via mgetty's AutoPPP option, but it still uses pppd to initiate the protocol. I created a file with options for each of the serial ports (speed, which IP address to assign to which modem, which DNS server to use).

hostnames and IP addresses of our dialins — to the domain master. The caching name server we ran locally did exactly as the name suggests. If a user requests www.altavista.com, for example, the local name server requests the IP address from a higher-level DNS server (in our case this was Telstra, as it was the shortest hop), and caches the result. The next time the name is requested the system already knows the IP address and returns the query immediately.

We did experience some trouble with reverse DNS lookups. This caused a lot of trouble when trying to access services that

mail functions like Sendmail, but its internal workings differ greatly. I chose qmail over Sendmail for its speed and its configuration and security options.

Using the username file and shell script from earlier on, I added the mailboxes for each user to create the `~/Maildir/directory`, and set the correct permissions. The SMTP server was run from a new System V init script which ran a few checks then started the SMTP daemon.

The POP3 server was run from `inetd`, which involved adding a standard line to the `inetd.conf` file.

```
pop3 stream tcp nowait qmailp
/var/qmail/bin/qmail-popup qmail-popup
localhost /bin/checkpassword
/var/qmail/bin/qmail-pop3d Maildir
```

SQUID (squid.nlanr.net)

SQUID is a caching proxy that caches requests from the Internet. Anyone who has configured SQUID will be familiar with the ordeal of parsing the whole 1,300-line configuration file to change about 20 options. Because our server only had a relatively small amount of data passing through it, SQUID was probably doing more harm than good. I eventually made our cache a child to one of Telstra's caches and after that it functioned more smoothly.

Apache (www.apache.org)

We also created a Web site to represent the ISP, using the standard Web server, Apache. Only basic settings such as the HTML root directory and users' home page directories needed to be changed to represent the local configuration.

ProFTPD (www.proftpd.org)

ProFTPD was chosen because it is highly configurable. Initially we had two different setups on the same machine: one for anonymous FTP access, the other restricted to user home pages. With ProFTPD this was as easy as having two different sections in the `proftpd.conf` file. Not long after we went online, I borrowed an old Pentium 120 running Debian Linux to act as the anonymous FTP server. This picked up some of the main server's load, and meant that we only needed two simple setups.

Samba (www.samba.org)

One of the other group members was planning to update the Web site from a Windows machine and thought it might be cool to set up SMB shares for doing so. I used the Red Hat Package Manager for this as we didn't need any of the latest features and it requires little configuration.



BIND (www.isc.org/products/BIND)

BIND is a package of tools for running and querying DNS servers on the Internet. Only the caching name server portion of BIND was used, because our domain was part of a national hub that handled the DNS for the separate regions.

We were required to submit our section of the DNS configuration file — containing IP addresses of our mail, secondary mail and FTP servers and the

resolve IP addresses to hostnames for security (eg. some FTP, Telnet and IRC servers). A check of the DNS section that was submitted to the domain master revealed no problems with our configuration, but the problem was never rectified.

The above bare-bones configuration would allow users to browse the Web. Next on the list were the local mail, Web, file sharing and caching services.

qmail (www.qmail.org)

This worked quite well and I found the SMB shares easier to use for updating the pages from my Linux box.

The link

The link was a permanent 33.6Kbps link to Telstra, as a permanent 56K link or an ISDN link was too expensive. You can imagine how slow the link was when two or three users were connected at the same time, let alone when all modems were full (which was only once or twice). This was setup's biggest failing; the service could never realise anywhere near its full potential on such a slow link.

Telstra permanent dialup links use an authentication method called CHAP (Challenge Handshake Authentication Protocol), which adds advanced security to the standard PAP (Password Authentication Protocol). Connecting was supposed to be easy, but I found that adding the correct information to the 'CHAP secrets file' was tricky. I managed to get it right after a few attempts.

Security issues

Even though the system wasn't exactly holding secret CIA documents, security is always an important issue when setting up any network service. I secured the server by ensuring that:

- no superfluous services were running. As well as taking up valuable resources they may leave you open to security breaches;
- all ports that weren't in use were closed by commenting out any unwanted services from `inetd.conf`;
- monitoring programs would alert me to who was accessing the system. I used a program called `jail` that allowed me to log requests on specified ports to the system log. Amateur crackers — who are the most likely to exploit your system — usually investigate your system before they act. Logging suspicious activity gives you a better chance of tracking down a culprit if anything does happen;
- I kept an eye on security archives on the Web, such as BugTraq, for the discovery of any new vulnerabilities (nine times out of 10, the security fixes supplied in a distributions erratum will appear in a security archive on the Web a few days before they're issued officially);

System Uptime...

Host:	Time:	Uptime:	No. Users:	Load average:
www.org.au	2000/10/14	9 days, 7 hours, 21 minutes	5	0.08, 0.11, 0.05
ftp.org.au	10/14/00	37 days, 8 hours, 26 minutes	1	0.02, 0.01, 0.00

ACUA Stats...

Username:	foo_men
Utilization:	98.17%
Online:	YES
Allowed Logins:	1
Idle Limit:	[153000000, 0.0100]
Time:	Total: 100.00% Res: 100.00% (0.0100)
Data:	Total: 100.00 MB Res: 100.00 MB
RA Data:	Total: 100.00 MB Res: 100.00 MB
TX Data:	Total: 100.00 MB Res: 100.00 MB
Uptime:	Monday 14/10/2000
Last login:	Monday 16/10/2000

▲ ACUA is an account and administration program for simplifying access to the server.

- I regularly ran a program like SATAN or SAINT on the system to double-check the configuration.

I found that TCP wrappers are one of the easiest and fastest ways to enforce rules on what services people can access. I also found that restricting Telnet and SSH (Secure Shell) to specific IPs is a security advantage.

Going live

By the time the ISP was opened up to the public, we'd put the system through quite a bit of testing. Surprisingly, it required little actual administration. Once the initial setup was complete and we were online, I rarely had to be physically at the machine. I found that I could administer the server from home using SSH over a permanent modem link.

We added users to the system at the rate of one per week using a simple Perl script called 'add2sys'. To add a user to the system was a simple matter of running `add2sys <username>`. Most of the work I did involved writing Perl scripts to simplify tasks or obtain information from the system, such as user details and system usage statistics. To generate statistics for our Web page, I used a program called `Webalizer`, which outputs graphical charts of Web site statistics.

Lessons learnt

The key point to remember is that you don't get a project of this magnitude off the ground successfully without some preliminary research and planning. Admittedly, the actual execution and setup involved a small amount of trial and error, but no more than usual for a 'ground-up' operation.

The only notable weakness in our hardware line-up was the lack of a UPS (uninterruptible power supply). The power supply proved to be unstable during storms, and we experienced blackouts on several occasions. Needless to say, this crashed our system and we had to reset the options on our modems each time. Amazingly, the FTP server never reset its uptime during the outages, even though it was plugged into the same power point.

What started out as a small community experiment — put together by a handful of dedicated geeks out of spare parts and an open source OS — is now a fully fledged community-based ISP in the Illawarra region of NSW. Over the last two years, the service has been reliable enough to develop a substantial membership base, and this is as much a triumph for Linux and the open source community as it is for the members of the project.

Jon Kinred

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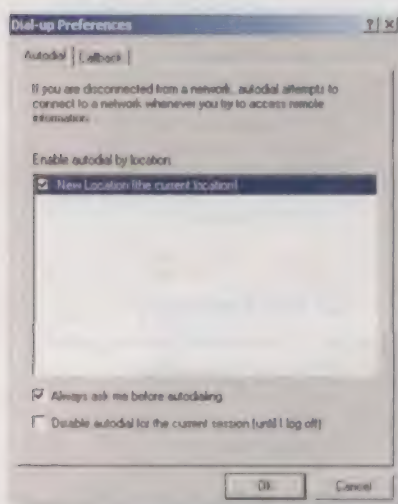
Multitasking mania

This month, we explore Windows 2000 Professional's networking capabilities, and provide basic networking tips as well as an explanation of how to allow Internet connection sharing and multilink connections with Windows 2000. We also show you how to create multiple desktops in Windows 98 and look at a range of shareware programs to help you set up and manage your desktops.

Windows 2000

A variety of network connections are possible under Windows 2000 and we'll take a look at some of them here. If you have some older computers, why not put them to good use by buying a couple of network cards and experimenting with a small LAN?

Dialup connections



▲ Windows 2000 will automatically connect to your ISP if you choose.

Of all network connection types, a dialup connection to an ISP is the most common. Configuring a dialup connection under Windows 2000 is almost the same as setting one up under Windows 98, so we won't repeat the explanation here. Instead, we'll take a look at some of the additional functions provided by Windows 2000 Professional.

Windows 2000's autodialling feature will connect you to your ISP automatically whenever access to the Internet (or other dialup network) is required. When enabled, autodialling detects when a

resource is not available (for example, if you are not connected to the Internet and you click on a Web address that is embedded in a Word document). If it is the first time you've tried to reach that resource, autodialling will ask which connection to use to reach your ISP. The next time you try to use that resource, autodialling will dial and connect to your ISP automatically.

To enable autodialling, open Network and Dial-up Connections. Under the Advanced menu option, click Dial-up Preferences. On the Autodial tab, tick the box next to the preferred location and then click OK. The autodialling feature only works when the Remote Access Auto Connection Manager service is started. If this has not been started, you will have to open the Service console found in Start, Settings, Control Panel, Administrative Tools. Scroll down to Remote Access Auto Connection Manager and, through the right-click menu, start the service.

The LAN (Home Area Network)

Home networking is becoming more and more popular. For some, the advantages of file and printer sharing are appealing, while for others, networked gaming is more than enough of a reason to set up a network.

Not all networks are used for the same purpose, so selecting the correct protocol to use is important. The three main protocols to choose from are NetBEUI, IPX/SPX and TCP/IP.

NetBEUI (NetBIOS Enhanced User Interface) is the protocol of choice for small Microsoft networks (one to 200 machines). It is easy to set up and use — all you need are unique computer names. However, it does have its limitations. NetBEUI is not routable and is no good for Internet sharing or networked gaming.

IPX/SPX (Internet Packet Exchange) is the preferred protocol for multiplayer gaming networks. IPX is the native NetWare protocol used on many earlier Novell networks. Under Windows 2000, it is implemented through the NWLink Protocol. IPX/SPX is routable, but it's not good for Internet connectivity. The main reason you'd use IPX/SPX is when a multiplayer game requires it.

TCP/IP (Transmission Control Protocol/Internet Protocol) is an advanced protocol, but it consumes more bandwidth than protocols that have been optimised for LANs. You may find the speed trade-off a little expensive if you only need a protocol that supports file sharing.

Using TCP/IP requires a little more configuration than the other protocols. Large networks will usually have a DHCP (Dynamic Host Configuration Protocol) server that assigns network IP addresses. In a small network, Windows 2000 will look for a DHCP server each time it is started and when it can't find one, it will assign a random address. To prevent this from happening, you can assign an IP address manually.

To assign an IP address manually, open Network and Dial-up Connections and select your local area connection. Select Internet Protocol (TCP/IP) and then click Properties. Click the radio button labelled 'Use the following IP address' and then enter the IP address and subnet mask. The subnet mask defines which subnet the computer is part of, so all computers in the same subnet must begin with the same set of numbers. For example, in the subnet definition 255.255.255.0, the first three numbers in the IP address identify the subnet, and the fourth number identifies the individual computer.

You may wish to vary the protocol you use. Install all three protocols, but only enable them when you need them. If you enable protocols that are not needed, it can marginally effect network performance.

Adding the protocols for your LAN connection involves going to the Local Area Connection properties window again. Click the Install button and add the protocols you require. Once installed, a protocol will only be enabled if its checkbox is ticked in the Local Area Connection properties dialog box.

If you have set up a LAN connection and been successful in getting your Windows 2000 machine to access the other computers but have been unable to get the others to access your Windows 2000 machine, you might have to set up user accounts for them. You can make it possible for any user to gain automatic access to your Windows 2000 computer, but that's not always wise. To create user accounts, go to Start, Settings, Control Panel, Users and Passwords.



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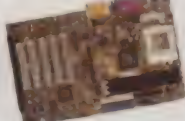
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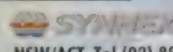
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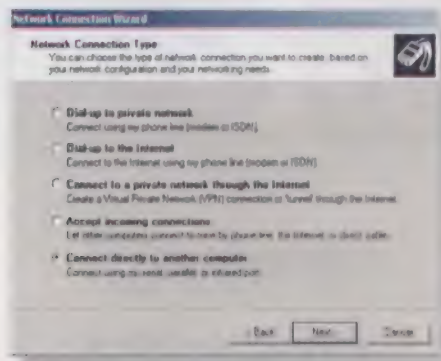
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Direct cable connections

You can connect computers that don't have network cards by using a parallel or serial cable.

You enable a direct cable connection differently under Windows 2000 than you do under Windows 98. In Windows 98, the direct cable connection utility is accessed from the Start menu. Once the utility is started, you must decide whether that computer will be the host or the guest. If it is to be the host, the utility sits and waits until the direct cable connection utility is run on the computer at the other end of the cable and establishes itself as a guest.

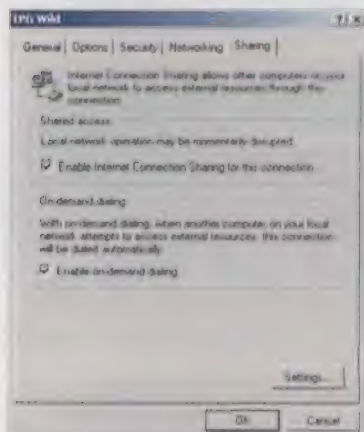
In Windows 2000 Professional, you set up a direct cable connection through Network and Dial-up Connections. To do this, click Start, Settings, Network, Dial-up Connections and then Make New Connection. The Network Connection Wizard will take you through the rest of the



▲ The Network Connection Wizard will have you connected in no time.

process. The option to 'Accept incoming connections' allows your system to establish connections automatically when other computers attempt to connect.

Internet connection sharing



▲ Share your Internet connection with all networked computers.

Many of you would have heard of Internet connection sharing (ICS). It provides multiple computer access to a single Internet connection. ICS was introduced with Windows 98 Second Edition, but third-party applications that perform the same task have been available for quite some time.

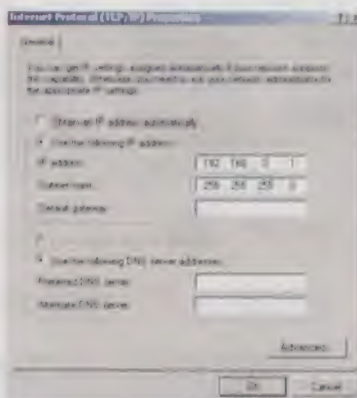
ICS works by channelling the Internet activity of all the computers sharing your connection through the IP assigned to the machine physically connected to your ISP. ICS is like a simple proxy server that routes data to the other networked computers.

So how do you go about enabling ICS on your Windows 2000 machine? First, you have to set up ICS on the computer that has the connection you want to share. You then need to make a few adjustments on the other networked computers so that they can correctly communicate with the shared Internet connection.

Enabling ICS on the machine hosting the connection is easy. Right-click on the connection you want to share and click Properties. Under the Sharing tab select the 'Enable Internet connection sharing for this connection' checkbox. Beneath this checkbox you are given the option to 'Enable on-demand dialing'. With on-demand dialing, the ICS computer automatically dials and connects to the Internet when any of the networked computers perform a task that requires Internet access.

Allowing other computers to dial in to the Internet through the ICS computer poses a problem. How will that connection be closed when the remote machine is finished with it? You don't want to stay connected to the Internet when you're not using it, especially if you are being charged by the minute. To solve this problem, you can have your modem disconnect after a certain period of idle time.

Under Phone and Modem options in the Control Panel, click on Modems and



▲ Manually assigned IP addresses will speed up Windows loading.

select Properties. Click the Advanced tab and then click 'Change default preferences'. Select the 'Disconnect a call if idle for more than' box under Call preferences on the General tab and enter the number of minutes you want the modem to wait before disconnecting.

The other networked computers need to have any static IP addresses changed to dynamically assigned ones. The ICS computer is assigned the 192.168.0.1 IP address (the 192.168 range is reserved for private LANs). The same computer also acts as a DHCP server and assigns IP addresses to the other computers.

On each of the networked computers, open Internet Explorer and select Internet Options from the Tools menu. On the Connections tab, click 'Never dial a connection' and then click LAN Settings. Make sure that all the checkboxes are cleared.

Now that ICS is enabled and configured on all networked computers, you can gain access to the Internet from any of them. Because you are sharing a single Internet connection, bandwidth must be shared between computers when there is simultaneous access.

Multilink connections

Increasing the bandwidth provided by your Internet connection is possible if you have multiple connection devices and your ISP supports multilink access. This feature combines multiple physical links into a logical bundle, and the resulting aggregate link increases your available connection bandwidth. For instance, if you have two modems installed with two separate phone lines, you can combine the bandwidth of both of them.

To enable Windows 2000's multilink feature, open the dialup connection to your ISP and select Properties. If you have multiple devices installed, they will be listed here. Select the devices that you want to use and go to the Options tab. In the Multiple Devices area select 'Dial all devices'. The next time you connect to your ISP, both modems will simultaneously dial in and an aggregate connection should be initialised.

Windows 98

You can make Windows 98 capable of something Linux and UNIX Window Managers have been using for a long time: multiple desktops. The ability to create numerous desktops and tailor each one to its appointed task, is a handy feature for anyone who regularly multitasks

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in Windows 98. You'll probably be able to utilise multiple desktops to make the best use of your computing time.

Microsoft does not provide native support for multiple desktops with Windows 98, but shareware is available which allows you to do this. We've chosen three applications from the large range of excellent software available: Extended Desktop 1.0, Cool Desk Version 3.1 and XDESK. These applications have been chosen because they provide a range of alternative applications for creating multiple desktops under Windows 98, from the simplest to the most powerful.

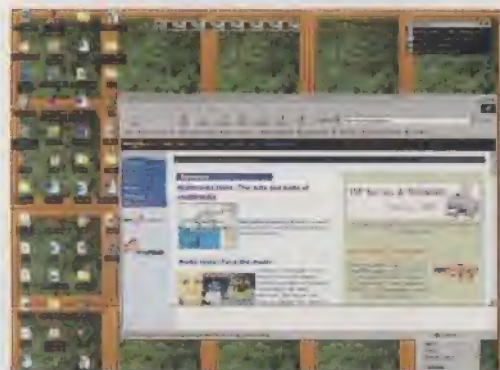
Extended Desktop

Extended Desktop (www.cam.org/~fourman/exdesk) allows access to three individual desktops. It is lightweight enough to run on any Windows 98 system comfortably and quickly.

Documentation for this product is also lightweight, but it isn't really necessary. You navigate through the three desktops by left or right-clicking the mouse on the numeral in the bottom right Windows 98 taskbar. The application responds promptly to navigational requests, but it doesn't provide many opportunities for customising and extending each desktop. We couldn't customise Extended Desktop's features to allow us to jump between desktops with keyboard triggers, nor could we individualise the Display Properties of the new desktops. This feature has been deliberately limited to minimise demand on the CPU.

Cool Desk

Cool Desk Version 3.1 comes from Shell Toys (www.shelltoys.com). Unlike



Extended Desktop, it provides a wide range of controls and accessories, but it makes more demands on system resources. When it is installed, a navigational bar for jumping between desktops



and an item list for selecting active applications appears on the desktop. On the taskbar, the Cool Desk icon allows you to customise hotkey triggers, create additional desktops and specify different wallpapers for individual desktops. It also provides a comprehensive help function and even the option to download skins for the Cool Desk interface. This professional software surpasses Extended Desktop by providing more extensive features and documentation.

XDESK

Installing XDesk Software's XDESK (www.xdesksoftware.com) is a little more complex than installing Extended Desktop and Cool Desk. It prompts you for decisions about placement on the Programs menu, autoloading on startup, and specific customisation for the appearance and behaviour of its desktops.

XDESK introduces two new toolbars to the Windows 98 desktop and adds a CPU usage monitor and tab buttons to the taskbar for each additional desktop. The first taskbar contains shortcut icons to common Windows 98 functions such as the calculator, the CD player, ICQ and Dial-Up Networking. The second taskbar becomes evident as soon as you move the cursor over the application task list in the bottom right of the Windows 98 desktop; a navigational map appears which allows you to click between desktops.

By right-clicking on the tabbed desktop panes — listed numerically next to the CPU monitor — a file menu with an exhaustive list of options appears. Here you can add or delete desktops, create special rules for the behaviour of your mouse and desktops, set desktop alarms and reminder notices, customise wallpapers and the appearance of icons on the Windows 98 taskbar, and add icons to the shortcut taskbar.

Windows shareware

EZ-Split 2.5 beta1

Use this program to split large files into more manageable sections.

Math Maniac 1.6

This is an easy and fun way for kids to practise their maths.

Voicings 1.2

You can create music without an instrument using this program.

WinAccelerator 1.1

Allocate CPU time to your most important applications with the aid of this program.

Xara3D 4.0

This program will allow you to create stunning 3D text.



All these packages can be found on this month's cover CD, along with more detailed reviews.

Which software should you choose? As usual, it depends upon your needs and your hardware.

Extended Desktop is useful because it does what it claims to do well, but nothing else. It suits those who want a desktop application that will provide basic functions without being too demanding on the CPU. Cool Desk takes the performance of Extended Desktop to the next level, with some additional features that place extra stress on your CPU. Cool Desk would be the best choice for most medium-sized systems and for those who do not want to have to think too much about the configuration of their desktops. XDESK is best for those who want to exercise further control over their desktop environment, and have a system capable of handling a heavier graphics load.

Kieren McNamee and
Nicholas Farmer



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Nicholas Farmer can be contacted at nickf1atz@iname.com.



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Use Samba to share files and printers
between Windows and Linux.

Let's Samba

Two things are becoming more popular in home and small office environments: networks and Linux. It's relatively easy to share bandwidth between Windows and Linux when they both use TCP/IP as their network protocol, but getting them to read each others' files and share printers is not nearly so straightforward — unless you use Samba.

Samba is the Linux implementation of the Server Message Block (SMB) protocol. This is used to allow file system and printer interaction across networks with more than one operating system. You can use Samba to perform any of the following tasks.

- Mount Windows folders on to your Linux computers
- Mount Linux file system segments on to your Windows computers
- Print from Linux computers to a printer attached to a Windows computer
- print from your Windows computers to a printer attached to a Linux computer

There are two different daemons that provide SMB service on a Linux machine: `smbd` and `nmbd`. Together, these provide everything you need to run Samba. The `smbd` daemon is the service that handles file and print sharing. It receives requests from clients and reacts according to the server configuration. The `nmbd` daemon handles NetBIOS and WINS name translation — two low-level Windows protocols. The important one for our purposes is `smbd`.

Samba's configuration file, `smb.conf`, is located in the `/etc/` directory. It contains Samba's usage settings. You can see a sample Samba configuration file in listing 1 on page 54 (a copy of this file is also on this month's cover CD). It's divided into two sections: global settings and share definitions. The global settings affect the Samba server as a whole, while the share definitions allow you to configure specific options for each file system segment you wish to make available to your Windows computers.

Lines that begin with a hash character (`#`) are comments that explain parts of the configuration file. These are ignored by Samba. Lines that begin with a semicolon (`;`) are also ignored, but they do contain valid Samba instructions. You make the line active by removing the semicolon.

In the first section, the workgroup setting allows you to assign a name to a group of machines. The server string setting assigns a descriptive entry to your server.

The hosts allow setting provides a form of access control to your Linux computer. Hosts can be specified by name or IP address, or as a range of addresses. You can also use the invalid users setting to prevent certain usernames from accessing your resources through Samba. In listing 1, the global settings limit access to the server to those computers in the same domain (ie 134.148.). Of these computers, any from unusual or privileged accounts are prevented.

The printcap name statement sets the file that Samba looks to when it needs to access printers. The load printers statement is more basic. If you specify 'yes' here, then all the printers specified in the file set above in the printcap name statement are loaded for use by Samba-con-



nected machines. Specifying 'no' refuses access to the printers over SMB. The printing statement can mostly be ignored. It determines how Samba tries to talk to the printers. The possible values here are mainly the names of Unix variants like SYSV and AIX — this setting need only be changed if you are configuring Samba on a non-Linux version of Unix.

As you can see in listing 1, there are a number of settings in the global section. You should consult the manual (`man`) page for Samba to find out what all of these do. The only really important one left to discuss is the security statement.

The security statement determines how clients authenticate themselves with the server. There are four different security settings available.

- **security = domain** authenticates incoming connections through a Windows NT domain controller. Linux machines must first be added to the Windows domain using the Linux `smbpasswd` command. For Windows users to gain access to folders on the Linux computer, they must have an account on it with the same name as their Windows account.
- **security = server** authenticates incoming connections with the help of another SMB-capable server. This server must be specified with a password server statement.
- **security = share** does not require any form of authentication from incoming connections. It is primarily used for print servers.
- **security = user** requires Samba clients to authenticate like any other user would at login. This is the default setting. For networks without a Windows NT primary domain controller, this is the best setting.

The second section of the Samba configuration file (`/etc/smb.conf`) is where you set up each share that you want to offer from the computer. Each share is named within brackets. In listing 1, our first share example is `[homes]`. This share has a special meaning to Samba, and actually refers to users' home directories on the computer. In other words, you can make Linux home directories available over a network to Windows-based computers. This means that you can maintain your Linux directory by using Windows Explorer and other tools as if your Linux directory were another drive on your Windows computer.

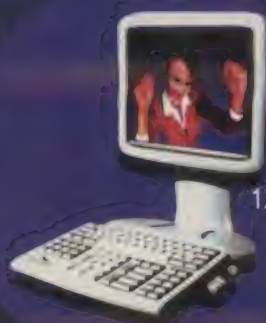
The comment option allows you to enter descriptive text that will be displayed when clients look for what your Samba server offers. The option entitled `browseable` allows you to control whether a particular share — in this case, home directories — is displayed when users browse the available shares on the Samba server. Having the `writable` option set to 'yes' configures the share as read-write.

Other shares also need to be defined. Some of these have special options. For example, the `[www]` share gives users access to their own `public_html` directories for Web publishing purposes. In this case, the physical path that Samba should use is the `public_html` directory under the user's home account directory. Here, the

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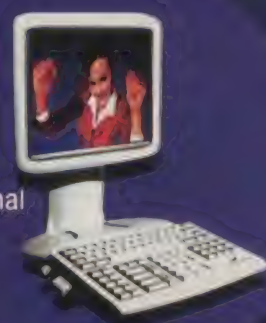


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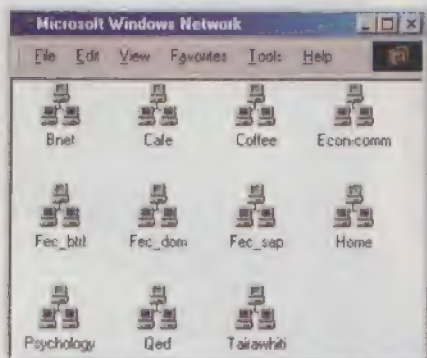
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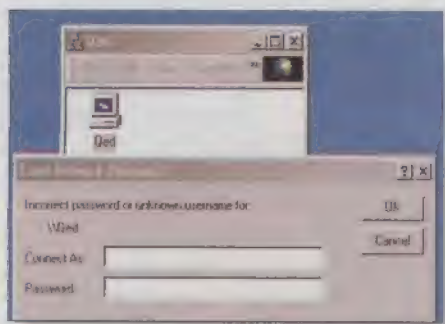
%H is expanded by Samba to the full home directory path of the authenticated user. In the [mgshared] share, you will see that an explicit absolute path is used.

Another special share name is [printers]. This share sets the default for all printers configured on this Samba server. The main new option here is printable, which affects whether the Samba server will allow clients to send print jobs to it. This means you can configure a printer on your Windows computer by specifying it as a network printer served by your Samba server.

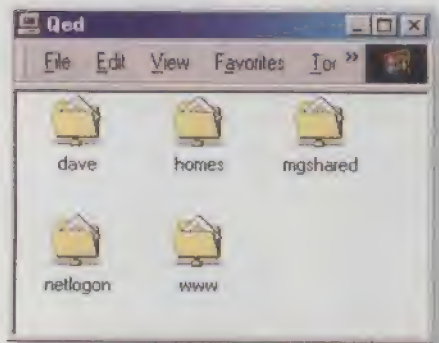


▲ Figure 1: Browsing a Windows network — QED shows up, even though it is a Linux box

In figure 1, a network is browsed from Windows to view the Samba server — QED — even though it does not run Windows. To browse QED, you must be authenticated, as in figure 2. You can then see the resources available, as in figure 3.



▲ Figure 2: Windows prompts for authentication information before allowing access to QED's resources.



▲ Figure 3: Browsing QED's shares, served by Samba

Listing 1: A sample smb.conf file

```
#===== Global Settings =====
[global]
    workgroup = QED
    server string = QED - Samba 2.0.6
    hosts allow = 134.148.
    invalid users = root bin sys daemon adm lp backup
    interfaces = eth0
    load printers = yes
    printcap name = /etc/printcap
    printing = bsd
    max log size = 2048
    security = user
;    encrypt passwords = yes
    socket options = TCP_NODELAY
    message command = /bin/mail -s 'message from %f on %m' root <%s; rm %s

#===== Share Definitions =====
[homes]
    comment = Home Directories
    browseable = yes
    read only = No
    writable = yes
    create mode = 0700

[netlogon]
    comment = Network Logon Service
    path = /usr/lib/netlogon
    guest ok = yes
    writable = no
    share modes = no

[www]
    comment = Files for the Webserver
    path = %H/public_html
    browseable = yes
    read only = No
    create mode = 0755

[mgshared]
    comment = Shared directory
    path = /export/home/mg/shared
    valid users = dave maryanne
    read only = no
    public = no
    writable = yes
    create mask = 0765

[printers]
    comment = All Printers
    path = /var/spool/samba
    browseable = no
    guest ok = no
    writable = no
    printable = yes
```

This listing can be found on this month's cover CD, along with more detailed reviews.

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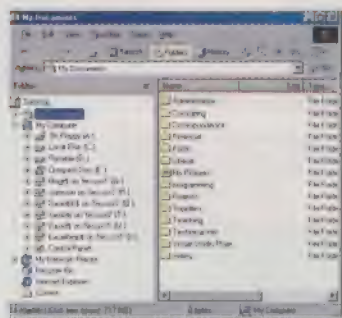
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▲ Figure 4: Windows Explorer before mapping a QED share

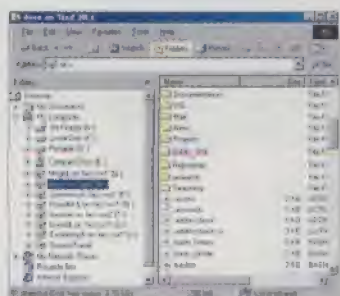
In figure 4, a plain Windows Explorer window is open. In figure 5, one of our Samba resources from QED has been mapped as drive M:. The same files will be issued from from a Linux file manager. You can now maintain all the files in your account as if they were on a Windows drive.

You can tell if Samba is running on your Linux computer by using the command `ps -ef | grep smb`. This will show the process ID of Samba, if it is available. If not, you may need to install it. If you are using Red Hat, log on to your computer as the root user. Insert the Red Hat CD into the CD-ROM drive and type the commands below.

```
mount /mnt/cdrom /dev/cdrom
```

then

```
cd /mnt/cdrom/rpms
```



▲ Figure 5: Windows Explorer, after mapping a QED share (drive M:)

This will mount the CD-ROM onto your file system and change your current directory to the `rpms` directory on the CD. Before you install either the Samba client or server, you have to install program files needed by both. Type `rpm -ivh samba-common` and then press Tab to expand the filename. Press Enter to install the package.

To install the Samba client, type `rpm -ivh samba-client`, and press Tab to expand the filename. Press Enter to install the package.

To install the Samba server, type `rpm -ivh samba-2`, and press Tab to expand the filename. Press Enter to install the package.

Edit your `smb.conf` file as described above to start offering Linux partitions and printers to your Windows computers.

If you want to make a Windows printer available to Linux through SMB, use your Network control panel to open the File and Print Sharing dialog box and check the option entitled 'I want to be able to give others access to my printers'. Click the Access Control tab in the Network control panel. You have two options from which to choose how your share security is conducted. Click the radio button entitled 'Share-Level Access Control' if you want everyone accessing the share to use a single password — including no password at all. Click the radio button entitled 'User-Level Access Control' if you want to determine which individual users and groups have access to the share. Click OK to close the Network control panel. Windows may ask you to insert your Windows 98 CD-ROM.

To offer a printer to Linux, go to Start and choose Printers from the settings cascade menu. Highlight the icon for the printer you wish to share. Right-click on it and select the Sharing option from the pop-up menu that appears. This shows the Sharing Properties dialog box as in figure 6.

Click the Shared As radio button to make the printer sharable. Enter the name you wish to call the share, any descriptive text you like, and then specify an access control method.

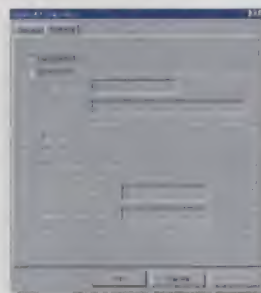
You must now edit `/etc/printcap` on your Linux computer — this file passes the print job to a filter called `/usr/bin/smbprint` that is installed with Samba. For example, if you want the Windows printer to be known as 'ij' under Linux, enter the definition below in `/etc/printcap`.

```
ijlinkjet:\
:sd=/var/spool/lpd/inkjet:\
:sh:\
:if=/usr/bin/smbprint:
```

You now have a new Linux printer defined as 'ij'. However, you need to tell `smbprint` what to do with requests to this

printer. This is done with a file called `.config` in your local directory. The format of this file is as follows.

```
server = NetBIOS_name
service = printer_service_name
password = "printerpassword"
```



▲ Figure 6: Sharing a resource from Windows so that it is available to others

Typically, the password entry is simply "" because no password is usually required for print services. The server and service settings must be set to the name of your Windows computer, and to the name that is given to the printer on that computer (you'll find this information under your Windows printer settings).

Finally, Samba needs to be restarted so that it will load the new printer definition. We do this by typing the command `/etc/rc.d/init.d/smb restart`.

You can now share resources between your Windows and Linux computers on a network without your users even being aware that there are different operating systems in place.

David Williams

Linux Freeware

Apache 1.3.12

Apache is the world's most popular Web server. It runs on over half of all WWW sites.

Apache::ASP 2.0

A module allowing Active Server Pages to be served from Apache.

Apache JServ 1.1.1

This Java servlet engine is fully compliant with JavaSoft Java Servlet APIs 2.0.

PHP3 Module for Apache

This scripting language dynamically generates Web content.

PHP4 Module for Apache

This complete and easy to use Web portal toolkit is used by many major sites.



These Linux shareware programs and more can be found on this month's cover CD.



For a complete archive of APC Linux columns, see apcmag.com.



David Williams can be contacted at dave@qed.newcastle.edu.au.



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Going wireless

In a previous column devoted to surfing the Web on your Palm device, we mentioned that it is possible to connect to the Internet using a mobile phone equipped with an IrDA port and a built-in modem (see APC June, page 144). In this month's column you'll find out more about this process, and we'll tell you what you'll need to get it up and running on your Palm.

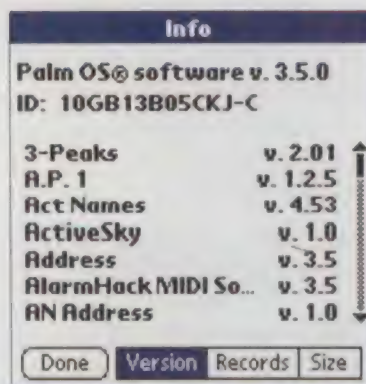
Ready

Even if your mobile phone has an infra-red port, there's no guarantee that you have wireless access. Not all mobiles with an infra-red port will work. For example, the Nokia 6110 has the port, but no modem to communicate with. Some phones that do work are the Nokia 7110 and 8210, Ericsson 1888, 600 and 700 series, Ericsson T28 (with di27 snap-on), and the Motorola L series. There are others that work, and you can get wireless modems for your Palm, so check with your phone manufacturer or local retailer for details.

Unfortunately, not every Palm is capable of using the infra-red port to connect to a mobile phone. New Palm IIIc and Vx PDAs come with the Palm OS 3.5, but other units may require a Palm OS upgrade to version 3.3 or an add-on patch to make them work properly. If you have a Palm III or a Palm Pro with the infra-red and memory update, you can apply the enhanced infra-red update included on this month's cover CD. Unzip the file and install all of the components. If you have a Palm III or higher with Palm OS 3.0 or 3.1, it would be better to upgrade to the Palm OS 3.3. It has several other enhancements such as faster HotSyncs and additional network communication settings. Although Palm Vx and IIIc PDAs come with Palm OS 3.5, it is not currently available on other platforms as an upgrade.

If you're not sure what is installed on your Palm, tap on the applications button on the silkscreen, tap the menu button and select the Info item from the pull down menu. This displays an information screen showing what applications are installed and how much memory they take up. Tapping on the Version button will show the exact version of Palm OS you are running and some other useful information.

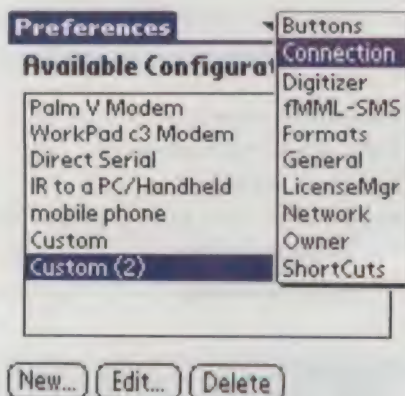
If you're already running Palm OS 3.3 or 3.5 you can skip ahead. If you have Palm V, III, IIIx; WorkPad c3 (40X, 40U),



30X, 20X; or an older Palm with the 2M RAM upgrade, go to www.palm.com/support/upgrade to determine which version of the Palm OS 3.3 you need. Read the instructions carefully as you need to disable or remove some programs that are incompatible with the upgrade process and might damage your Palm. When you install the upgrade, your Palm is backed up and reformatted with the new operating system, so it is important to make sure that you have a good backup of your data from a HotSync and an archive of your applications in case you need to reinstall them. Finally, make sure you install a fresh set of batteries before you do the upgrade. The process can take a long time and seriously drain your batteries.

Set

Now that the framework is in place, you need to tell the Palm about your modem. Tap on the application button and select All from the pull-down menu in the upper-right corner of the screen. Scroll down and tap on the Prefs icon to run the Preferences program. Next, tap on the General menu in the upper-right-hand corner and tap on the Connection item.



Bring the Net to your Palm using your mobile phone's infra-red port.

PDA shareware

Palm

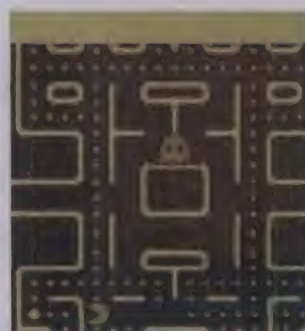
Galax

Based on the original arcade game Galaxian, Galax offers hours of fun.



Liberty

This emulator allows you to play Game Boy ROMs on your Palm.



Tornado V 1.1

This processor overclocking program allows you to configure each application on your Palm to run at a different speed.

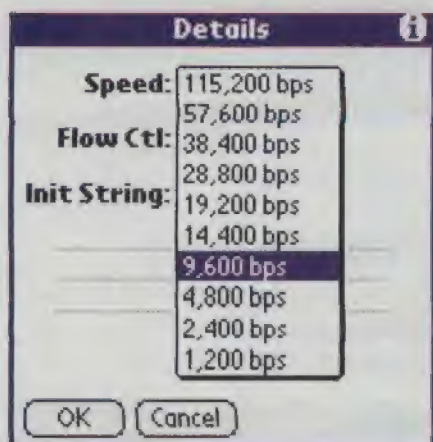
thinkDB

With this program you can create your own secure relational databases or use it with existing shareware databases.

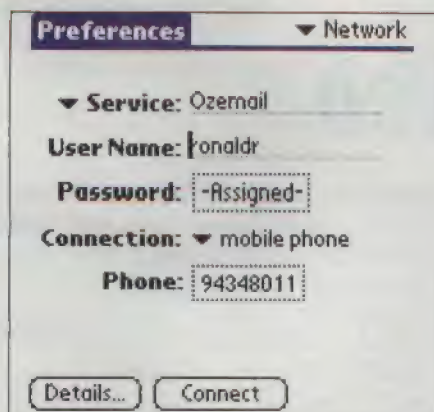
WorldMate

This program can compare four clocks to your home time, clothes sizes from the US and Europe and convert currencies.

You might want to create a new configuration by tapping the New button. Name your configuration whatever you like and under the Connection Method pull-down menu choose the IrCOMM to Modem option. Next, tap on the Details button and then choose the Speed pull-down menu and set it to 9,600bps. This may seem slow, but the existing GSM network in Australia only supports this speed, as do most mobile phones on the market. To finish off, select the OK button twice.

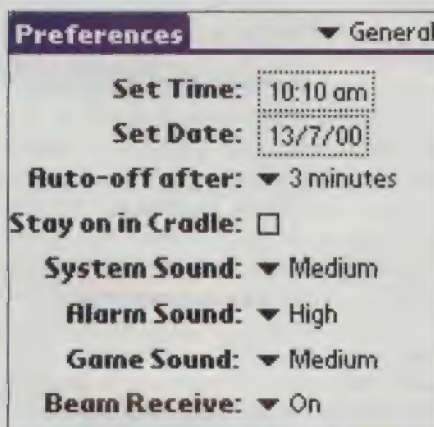


Now you need to tell the network dialler which modem to use when dialling. This is important as you might want to use a Palm III or V modem when you're on a landline to save money, but switch to the mobile phone when you're on the road. To do this, tap the Connection menu in the upper-right-hand corner of the screen and switch to the Network menu. From here, you can switch between different modems by tapping on the Connection pull-down menu and choosing the modem you want to use. You also fill in your ISP dialin settings here. Enter your ISP's phone number, your username and password to dial out. The other ISP-related settings can remain the same



regardless of whether you're using your mobile phone or a landline.

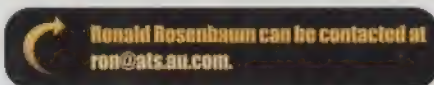
Finally, before starting you should make sure that the Palm won't shut down while you're connecting. Most people set the auto shutdown settings to 30 seconds or one minute to optimise the Palm's battery life. This is great for daily use, but if it's set too short the Palm will shut down while you're using the modem. Go to the General settings under Preferences and set the Auto-off after item to three minutes. Make sure when you're done to set this back to 30 seconds or one minute, otherwise your batteries will not last as long.



Go

To start your connection, use your mobile phone menu to activate its infra-red connection (consult your phone's user manual) and place your Palm's infra-red port within two or three centimetres of the one on your mobile phone. Next, run an email, Web or other Internet application that will automatically initiate the dialup connection.

Ronald Rosenbaum



Psion

5Account

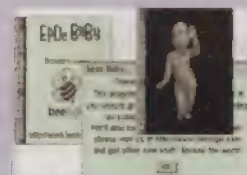
This personal banking program allows you to keep track of your bank accounts and credit card details.

Encore 0.2

Doom is finally available for your Psion.

Epoc Baby

Now you can add the world-famous dancing baby to your Palm.



Gen5 2.04

You can trace your family roots with this genealogy program.

Psitris

This is a version of the classic arcade game Tetris for the Psion.

PocketPC & Windows CE

PhoneTone for PocketPC

With this automatic dialler, you select the number you want to dial and then hold the speaker up to your phone.

PTE

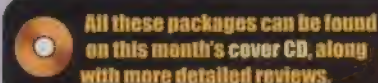
This free periodic table of elements program is full of information.

Yahoo Messenger for PocketPC

This PocketPC version of Yahoo Messenger supports voice chat and file attachments.

PocketPop

In this game, you must pop the bubbles before they fill up the screen.



For a complete archive of APC PDA columns, see apcmag.com.

Create CGI scripts using AppleScript to increase your Web site's flexibility.

Sharing the Web

Using CGI scripts to increase the flexibility of your Web site isn't just the preserve of industrial-strength Web servers. You can put CGI to work even if you are only running a small intranet based on the Mac OS Web Sharing feature.

CGI scripts can be created in a variety of languages, but we'll look at AppleScript because it is a standard part of Mac OS, and you are more likely to be familiar with it.

Web Sharing

Before we get down to business, here's a quick guide to using Apple's Web Sharing. Create an 'intranet' configuration in the TCP/IP control panel. If you have a network administrator, be guided by their instructions. If you are working on a small LAN under your own control (or an individual Macintosh) create a new configuration, select Manually from the Configure pop-up menu and type in an IP address in the range 192.168.0.1 to 192.168.0.255. Just be sure that no two machines on your network have the same number. Close TCP/IP, saving the changes.

Find Web Sharing in the Control Panels submenu of the Apple menu. Press the upper Select button to specify the folder that contains your Web site and the lower one to specify the file to be used as the home page. You have not created either of these yet, so you'll need to revisit this step later. Once the Web folder and home page have been set, press the Start button to start the server.

Hello world

We'll begin with an implementation of 'Hello world'. First, tell your script that it is going to handle CGI requests. Make the first statement in the script **on** handle CGI request and the last statement **end** handle CGI request.

The script should return a string containing the result of the script. The simplest version of the 'Hello world' script is:

```
on handle CGI request
    return "Hello world"
end handle CGI request
```

When you create this script in Script Editor, save it as an application with the Stay Open and Never Show Startup Screen boxes selected. Store your script in the folder you will be using for Web Sharing (or, even better, in a subfolder called CGI

within that folder). We'll use the name hello.acgi for this script. The suffix .acgi (asynchronous CGI) is used so that Web Sharing does not expect the result to arrive quickly.

Next, you'll need a Web page that includes a link to your script. At this stage you can hand-code it in SimpleText, save as HTML from a word processor, or use whichever HTML editor you prefer. The following sample HTML is sufficient for now:

```
<HTML>
<P>Click <A HREF="hello.cgi">here</A> to
test.</P>
</HTML>
```

This goes in the folder you will be sharing. Start Web Sharing, open a Web browser to 192.168.0.10 and you should see the invitation 'Click here to test'. Click on the link and you should see 'Hello world'. Select the script in the Application menu and quit it, otherwise you won't be able to save any changes you make to it.

The next step is to add HTML tags to the result generated by the script. You probably noticed that the text wasn't formatted. Try changing the string in the return statement to <HTML><H1>Hello world</H1></HTML>. Now save the script, reload the Web page in the browser, click the link and you'll see 'Hello world' displayed in the H1 (first-level heading) style.

It isn't very good design if your visitors have to navigate back to the home page with their browser's Back button, so we'll provide a link back. Things start to get more complex here, as we need to enclose the target of the A HREF tag in double quotes, although AppleScript uses that character to delimit strings. The solution is to precede the double quotes that are part of the string with a backslash (\). The string to be returned by the script is therefore "<HTML><H1>Hello world</H1><P>Home<A></HTML>". You can use "." as a reference to the home page if it is in the same folder as the script, otherwise a more lengthy specification is needed.

You can include other HTML tags such as graphics or tables. As the output from your script becomes more complex, it is a good idea to assemble the HTML in sections and then link them to give the string to be returned. However, we'll return only the minimum necessary for each example.

Mac OS shareware

Screen Catcher 2.0

You can use this utility to capture screens, windows or editable regions and save them in a number of palettes and file types. Menus and cursors can be included.

GraphicConverter 3.9.1

This program manipulates and converts most image formats, and includes an image browser, cataloguer and slideshow utility.

Fractal Domains 1.3.7

Starting with supplied data sets, you can produce intricate and beautiful images for desktops, screensavers, and backgrounds with this program.

PictoGizer 1.0b1

This utility allows you to view and quickly sort your images into multiple destination folders.

WebShocker 2.0.1

Making your own professional-standard Web animations is not difficult with this sophisticated but user-friendly package.

All these packages can be found on this month's cover CD, along with more detailed reviews.

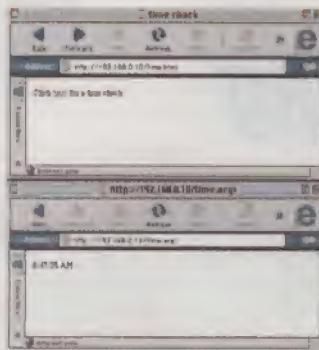
Information please

To build a script that manipulates information, you only need to add statements within the **on** handle CGI request block that collect the information, format it appropriately, and then pass it back to the server through the return statement.

To keep things simple, let's have the script produce the current time. In the example in listing 1, AppleScript's **current date** command returns the date and time. The time can be obtained from the result's time string value.

Using a 'try' block within your scripts to catch errors makes your scripts more robust and helps in the debugging process. Listing 2 is a version of the previous example with error checking.

You can have the error message display more information, such as the values of variables. To save space, we'll omit error checking from the rest of the examples.



▲ Using a CGI script to show the time

between the HTML form definition and the AppleScript (for example, if you were to use the argument name 'Colour' in the form and 'colour' in the script).

Turning the argument string into a list doesn't take many lines of code, but AppleScript is relatively slow. The Parse CGI OSAX (script extension) does the job more quickly, but carries a \$US10 shareware fee. It also performs tasks such as converting plus signs in the arguments back to spaces.

To illustrate the technique, let's extend the 'Hello world' example to greet the visitor by name. The script in listing 3 works with the file form.html that you will find on the cover CD along with other items from this article. The script separates the arguments as described above, then finds the argument called "name" and copies its value to the variable theName. This variable is plugged into the string to be returned.

Other information can be passed from the Web server to the CGI script. Examine the 'handle CGI request' event in the Internet suite of the Standard Additions dictionary for details.

The next steps

In the examples presented here, all the processing is done within the scripts. AppleScript's power lies in its ability to link applications. Maybe you've created a customer database and want to provide a co-worker with read-only access. This is easy with FileMaker Pro, but lesser databases, contact managers and similar applications might need help. AppleScript is valuable for extending their capabilities.

Perhaps you'd like a search engine for your site. Index the folder that contains the files by command-clicking on it and choosing Index Selection, then write a CGI script that uses Sherlock to search that folder and format the results. You'll find an elementary version of this project on the cover CD.


A few months ago, we demonstrated how Chipmunk Basic can be AppleScripted (see APC June, page 143). Some operations' functions might be more easily implemented in a Basic program that is called from an AppleScript CGI. The recently released Nisus email program was written in REALBasic, and there is a FutureBasic framework for creating CGIs for WebStar. REALbasic and FutureBasic are both commercial implementations of the language.

If AppleScript or Basic don't attract you, Perl is a popular cross-platform language for creating CGI scripts. Perl has versions for Macintosh will be a standard part of Mac OS X. For more information, see Jon Wiederspan's and Felipe Campos's work. You'll find the online link, along with links to other online resources, in the Workshop section of the cover CD.

Stephen Withers



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 For a complete archive of APC Mac OS columns, see apcmag.com.

Script listings

Listing 1

```
on handle CGI request
    set theDate to current date
    set theTime to time string of theDate
    return "<HTML>" & theTime & "</HTML>"
end handle CGI request
```

Listing 2

```
on handle CGI request
    try
        set theDate to current date
        set theTime to time string of theDate
        return "<HTML>" & theTime & "</HTML>"
    on error errMsg
        return "<HTML>Error: " & errMsg & "</HTML>"
    end try
end handle CGI request
```

Listing 3

```
on handle CGI request thisReq searching for args
    set oldDelim to AppleScript's text item delimiters
    set AppleScript's text item delimiters to {"&"}
    set arglist to text items of args
    set AppleScript's text item delimiters to {"="}
    ignoring case
        repeat with thisitem in arglist
            set thisitem to text items of thisitem
            if item 1 of thisitem = "name" then
                set theName to item 2 of thisitem
            end if
        end repeat
    end ignoring
    set AppleScript's text item delimiters to oldDelim
    return "<HTML>Hello " & theName & "</HTML>"
end handle CGI request
```


Getting down to the nitty-gritty
of how iostreams operate.

Ex-stream programming

In the very first C++ column (see APC March 1999, page 148) we introduced you to iostreams. We didn't explain them in great detail then, but promised we'd get back to that later. In the meantime, we've used the cin and cout streams, but we haven't attempted to get you to understand how they operate.

This month, we're finally going to try. In many ways, streams represent the best of object-oriented programming. You can use them as a powerful tool without ever understanding how they work. However, let's abandon the bliss of ignorance and explore them a little further.

A *stream* is a little like a data pipe. You can insert data into the stream without having to know where it goes, and accept data coming out of the stream without necessarily knowing where it came from.

The two best-known streams are cin and cout. The cin stream provides data from the computer's *standard input* (usually the keyboard), while the cout stream sends data to the computer's *standard output* (usually the computer screen). The cin stream is an object of class istream (short for input

operator (cin) and the insert (<<) operator (cout). The standard library implements the extract and insert operators for all of the built-in types, such as int and double. The STL string class also implements them so you can input and output strings directly. When you create a new class, you will often create your own extract or insert operator, so that you can directly perform input and output. Listing 1 is an example of this.

Being manipulative

While the <iostream> header defines the workings of the istream and ostream classes, a second header, <iomanip>, provides a collection of *manipulators*, functions and constants that can be used with the insert and extract operators to change the way a stream behaves. The table on the opposite page shows a list of common manipulators.

The endl manipulator is among the most commonly used. The line of code cout << 1 << endl behaves very much like cout << 1 << '\n'. However, it also does some internal flushing, so it's more useful. Until now, we've only used '\n' to avoid introducing manipulators, but from here on we'll use endl.

The flush manipulator also flushes the output stream, but without taking a new line. Consider listing 2. The compiler is not required to display the 1 and 2 strings until after the line cout << endl;. In other words, the functions Do_Something() and Do_Something_Else() may be executed before any output is displayed. Using Microsoft Visual C++ 6.0 and Borland C++ Builder, the output is displayed straight away. However,

using GCC 2.8.1 (DJGPP port), nothing is displayed until the 'endl' is output (see 'Undefined behaviour'). The solution is to use the flush modifier, as in listing 3.

The setw() manipulator sets the minimum width of an output. For exam-

Undefined behaviour

Most aspects of C++ are carefully defined by the ISO standard. However, where a rule does not exist it's up to the makers of a compiler to decide. As you might expect, they don't all decide the same way. For example, when you output something with cout and don't flush the output stream, some compilers display this straight away. Others store it in a buffer to be displayed when the line is complete or the program ends (whichever comes first).

Many programmers only work with one or two compilers and there's a temptation to say to yourself, 'It works with my compiler, so I'll use it in my program.' This is often a big mistake. If you ever need to change compilers or update your compiler to a later version, there's no guarantee it will still work. Wherever possible, it's best to rely only on standard behaviour.

ple, cout<<setw(10)<<5 will output nine spaces and a five. However, cout<<setw(2)<<12345, will not truncate the output to a length of two.

Manipulators like setw(), which change the behaviour of subsequent operations, are known as modifiers. A *transient* modifier only affects the insertion or extraction immediately after it, while a *persistent* modifier remains in effect until another modifier negates its effect. The setw() modifier is transient, but most others are persistent.

The setfill() modifier changes the character used to pad output fields. By default this is a space, but it can be set to another character. Listing 4 demonstrates how setfill() is used. The output from this listing will be ###1.

The oct, dec and hex modifiers cause integer i/o to be interpreted as octal, decimal or hexadecimal respectively. cin >> hex >> i reads an integer and interprets it as hexadecimal. cout << oct << 20 outputs the integer 20 (decimal) as an octal value (24 octal).

Next month we'll explore iostreams a little more. Until then, keep on coding.

Michael Smith



stream) while the cout stream is an object of class ostream (for output stream). As with most objects, cin and cout have data members and methods (functions).

The most common way to use the cin and cout streams is with the extract (>>)



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Stream I/O manipulators

Manipulator	What it does
setw()	Sets the minimum width of an output field. It will pad the field (extend it), but it won't truncate it (shorten it).
setprecision()	If either ios::fixed or ios::scientific has been set (using setiosflags()), the precision value determines the number of digits after the decimal point. If neither flag is set, the precision value determines the total number of significant digits.
setfill()	Sets the character used to pad fields (usually a space).
boolalpha	Insert (output) or extract (input) objects of type bool as names (such as true and false) rather than as numeric values.
noboolalpha	Turn off boolalpha.
fixed	Insert floating point values in fixed point format (with no exponent field).
left, right	Justify inserted fields to the specified width.
internal	Insert any padding between the sign and the number for signed numeric insertions.
oct, dec, hex	Set the radix for integer output to octal (base 8), decimal (base 10) or hexadecimal (base 16).
scientific	Insert floating point values in scientific format (1.2e+001).
showbase	Insert a prefix that reveals the base of a generated integer field. This will be '0x' for a hex number and '0' for an octal number.
no showbase	Turn off showbase.
showpoint	Insert a decimal point for floating point numbers even if there are no numbers after the decimal point, e.g. '10.' instead of '10'.
noshowpoint	Turn off showpoint.
showpos	Insert a '+' sign for non-negative numeric output.
noshowpos	Turn off showpos.
skipws	Skip white space after extracting an object.
noskipws	Don't skip white space after extracting an object.
uppercase	Use uppercase letters when inserting hex digits (0X9AB6 instead of 0x9ab6).
lowercase	Use lowercase letters when inserting hex digits (0x9ab6 instead of 0X9AB6).
flush	Flush output buffer. On some systems, output is not displayed until the end of the line is reached or the buffer is flushed.
endl	Insert end of line ('\n') then flush the output stream.

C++ source code

Listing 1

```
#include <iostream>
using namespace std;

class CDate {
private:
    int day, month, year;
public:
    CDate(int d, int m, int y) {
        day = d; month = m; year = y;
    }
    int Day() { return day; }
    int Month() { return month; }
    int Year() { return year; }
};

ostream& operator<< (
    ostream& os,
    CDate& d) {
    os<< d.Day() << " / "
    << d.Month() << " / "
    << d.Year() << endl;
}
```

```
#include <iostream>
using namespace std;

int main()
{
    CDate d(2, 4, 2000);
    cout<< d << endl;

    return 0;
}
```

Listing 2

```
#include <iostream>
using namespace std;

int main()
{
    cout<< "1";
    do_something();
    cout<< "2";
    do_something_else();
    cout<< endl;
    return 0;
}
```

Listing 3


```
#include <iostream>
using namespace std;

int main()
{
    cout<< "1" << flush;
    do_something();
    cout<< "2" << flush;
    do_something_else();
    cout<< endl;
    return 0;
}
```

Listing 4

```
#include <iostream>
#include <iomanip>
using namespace std;

int main()
{
    cout<< setw(4)
    << setfill('#')
    << "1" << endl;
    return 0;
}
```

 All these listings can be found on this month's cover CD.

One of the most important programming skills
is knowing how to fix a broken program.

Ironing out the bugs

One certainty about any computer program is that at some time or another, it will fail. This month, we suspend our exploration of applets and examine the Java Debugger (JDB).

Debugging is an art every successful programmer needs to master. Sadly, bugs appear almost as soon as you start coding. Although the Java compiler always detects syntax errors, it's possible to write code that is syntactically correct but not logically correct. This is one instance where you need a debugger.

Using JDB

The JDB can be found in Sun's Java Development Kit (JDK). All other Java environments should also contain such a tool. You can use JDB to inspect variables while a program is running, set breakpoints (to halt the execution of a program at a certain point), and execute code line by line (known as single stepping).

JDB is a command-line application, but can be used to debug graphical programs and applets as long as they have been compiled with the `-g` flag. The simple program we used earlier in this series — `students.java` — can be debugged if it's compiled using the command below.

```
javac -g students.java
```

The `-g` flag aids debugging by telling the Java compiler to include additional information in the resulting `.class` file. You can now run the program through the debugger with the following command.

```
jdb students
```

You'll be advised that JDB has initialised, and prompted as to what to do next. The class does not automatically run as it would if you used the Java interpreter. There are 30 commands you can enter at this prompt (see table for the most important ones).

A sample debugging session

The most common debugging technique is to place a breakpoint in a source line where you want to investigate the state of variables, or the visual appearance of the output screen.

To set a breakpoint, start a JDB session with the class file under investigation. The breakpoint must be placed on a line of

Command	Description
help (or ?)	Displays the commands supported by JDB
exit (or quit)	Terminates a debugging session
memory	Displays the amount of memory used and what's available in the Java Virtual Machine
!!	Repeats the last command
load	Loads a class into the debugger
run	Starts execution of a loaded class
classes	Lists classes currently known to JDB
dump	Displays all information for a thread, variable, class, field, or argument
list	Displays source lines (the original program file)
locals	Prints all current local variables
print	Displays information for a thread, variable, class, field, or argument
methods	Lists the class' methods
stop in class.method	Sets a breakpoint at the first bytecode of a method
stop at class:line	Sets a breakpoint at a line in the class' source code
clear	Removes all existing breakpoints
clear class:line	Clears a specific breakpoint
where	Displays the call stack
step	Executes the current line
next	Executes the next program line (and stops again). Method calls are not single-stepped
cont	Continues execution from breakpoint

code — setting a breakpoint on a line with just a comment results in an error message.

For instance, if you want to know how much money is in your students' bank accounts before they buy pizza or pay their rent, you'll see the following series of lines.

```
Student2.StudentNumber = 30;
Student2.Name = "Bill";
Student2.depositMoney (300);
```

```
Student1.buyPizza ();
Student2.buyPizza ();
Student1.payRent ();
```

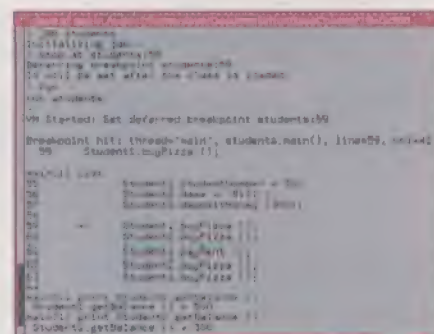
The line where `Student1.buyPizza()` is called is line 59 in your program. Line numbers aren't used in this Java program, but you need to refer to specific line numbers to tell JDB to break at arbitrary points. It's helpful if your text editor can tell you the number of a particular line in the file. Linux operators who use `vi` can press `CTRL-G`.

Use the following command to set a breakpoint on line 59.

```
stop at students:59
```

JDB will respond to this command with the following message.

```
Deferring breakpoint students:59.
```



▲ Figure 1: Running our program in the debugger

The breakpoint will be set after the class is loaded. JDB will run the program with the run command, executing each line until the marked source line is reached.

At this point, program execution is stopped and JDB commands can be entered again. This means you can inspect variables or other data elements and check any output to see that it is as expected.

To see where the program has stopped, use the `list` command. This shows a few lines of source code, and an arrow indicates where the execution stopped. To inspect the value of the students' bank accounts, the following commands are used.

```
print Student1.getBalance ()
print Student2.getBalance ()
```


Experiment with some of the other commands in the table. Use next to step line by line through the program. The locals commands can be used to display the value of all local variables simultaneously. Break inside the student class and use where to see the call stack of your program.

Software engineering

One of the most important phases of software development is checking that the application performs correctly and executes all the functions in its specifications. It's better to fix problems during development than after the application has been released or deployed.

Java console-based applications can sometimes be debugged by introducing print statements in the source. These display the values of local variables and objects, allowing detection and correction of program defects. However, graphical programs are not easily debugged this way, and all the print statements must be removed before the application is released.

Reverse engineering

While on the theme of debugging a compiled Java class, let's explore a new JDK tool. This is a command called javap — for 'java print', and fits into a class of programming tools known as disassemblers. javap will disassemble a Java class so you can explore the original source code. This is the opposite to using javac to compile a Java class in the first instance.

When called with no options and just a class name, javap lists the names of all public variables and methods in that class. For example, if you run javap over your student class, you get the following output.

```
> javap student
Compiled from students.java
class student extends java.lang.Object {
    public int StudentNumber;
    public java.lang.String Name;
    public student(int,java.lang.String,int);
    public student();
    public void depositMoney(int);
    public void payRent();
    public void buyPizza();
    public int getBalance();
}
```

javap tells you the name of the original source code file, and reveals that your class has StudentNumber and Name variables, two constructors, and four functions — one

of which takes an integer parameter, and one which returns an integer value.

This means that you can use javap to learn about the structure of Java classes that you have come across and may not have written yourself. In a well-written object-oriented program, all of the important entities are implemented as separate objects — or classes. In theory, you should be able to give a class file to other programmers and they can use all the functions of your object without having the original source code or even knowing how the underlying functions work. By using javap, the other programmers can even find out all the methods that are available to them in a class.

If you update your object so that it works in a more efficient manner, you can give your new, updated class file to programmers and, as long as the method names have not changed, they can simply slot it into their projects, replacing the old class, and their programs will continue to run just as before — but taking advantage of the enhancements you have made.

javap allows some options, one of which is a flag '-private'. If you use this option, then javap will also list private members of your class. In this case, you have one private variable in your student class:

```
> javap -private student
Compiled from students.java
class student extends java.lang.Object {
    public int StudentNumber;
    public java.lang.String Name;
    private int BankBalance;
    public student(int,java.lang.String,int);
    public student();
    public void depositMoney(int);
    public void payRent();
    public void buyPizza();
    public int getBalance();
}
```

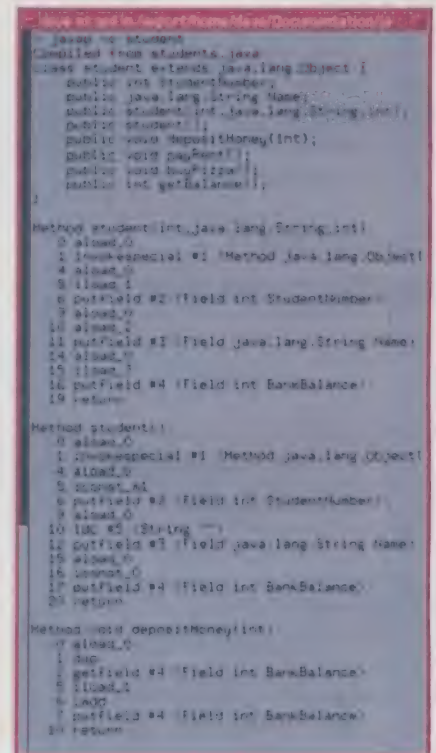
The BankBalance is now exposed. As this is a private variable, no other class can access it directly — they must always work through the public variables and methods you have provided.

javap will not go so far as to display your original source code in its entirety. In the above listings, the names of parameters to methods are not even listed. When javac compiles a Java program, it strips out all comments and blank lines and converts the Java code into an interpreted language known as byte code. The names of methods and some variables are stored in the byte code class file, but that is all — otherwise the ensuing .class

would be larger than the original .java program.

You can look at the byte code for a Java class by using the option -c with javap. In figure 2, you will see the byte code for your student class.

If you are familiar with assembly language, it might be vaguely reminiscent. However, for most of us it is meaningless. In any case, this is what the byte code looks like, and this is what the java interpreter executes when it runs your Java programs.



```
Compiled from students.java
class student extends java.lang.Object {
    public int StudentNumber;
    public java.lang.String Name;
    public student(int,java.lang.String,int);
    public student();
    public void depositMoney(int);
    public void payRent();
    public void buyPizza();
    public int getBalance();
}

Method student(int,java.lang.String,int)
  0: aload_0
  1: invokespecial #1: Method java.lang.Object.<init>()V
  4: aload_0
  5: aload_1
  6: putfield #2: Field int StudentNumber
  9: aload_0
  10: putfield #3: Field java.lang.String Name
  13: aload_0
  14: putfield #4: Field int BankBalance
  17: return

Method student()
  0: aload_0
  1: invokespecial #1: Method java.lang.Object.<init>()V
  4: aload_0
  5: aload_0
  6: putfield #2: Field int StudentNumber
  9: aload_0
  10: ldc #5: String ""
  11: putfield #3: Field java.lang.String Name
  14: aload_0
  15: aload_0
  16: putfield #4: Field int BankBalance
  19: return

Method void depositMoney(int)
  0: aload_0
  1: dup
  2: getfield #4: Field int BankBalance
  5: aload_1
  6: invokestatic #6: Method int BankBalance+
  9: putfield #4: Field int BankBalance
  12: return
```

▲ Figure 2: The byte code for your student class

With lots of determination and effort, sometimes a programmer can work out how the original source program was written through a disassembly listing. The reconstructed program will never be identical to the original source code because comments and spacing are not preserved in the byte code, but what is reconstructed can give an indication of how the original program's logic worked. This is known as reverse engineering, and it's a very sensitive subject in programming. Often, the licence that accompanies a software package states explicitly that it does not permit reverse engineering.

Next month, we'll be back onto command-line console applications and you'll learn about input and output to manage text input and disk file handling.

David Williams



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Data basics

In last month's Insite we created an online mailing list application that stored subscriber information in a Microsoft Access database. This month, we create some additional pages that allow you to modify and add new database records from a password-protected administration area.

Due to the large amount of code this month, we recommend you either open up the code pages from the cover CD on your PC, or print them out to refer to as you work through the article.

Creating the administration area

Four ASP pages were used in the mailing list example last month:

- **subscribe.asp** contains the subscription form with name and email fields.
- **subscribe_action.asp** is the action for subscribe.asp. It inserts a new record in the database with the details supplied by the user in the subscription form.
- **thankyou.asp** displays a simple thank you message when subscribe_action.asp has updated the database.
- **listview.asp** selects and displays all the email addresses from the database. It is password protected.

To create the administration area, you need to create a new directory called 'admin' inside the mailingList directory and then move listview.asp into this directory. You won't use listview.asp again because your admin pages supersede it, but it's a good starting point for main.asp, which is the page we are going to create to provide a detailed display of the database contents.

Password-protecting the admin files

First, create a new page called 'index.asp' in the admin directory and put a form in it that requests a userid and password. If the login details are provided correctly, a cookie is set and the user is redirected to another page. See August Insite (page 142) for details on how this works. The code is also included on this month's cover CD.

Viewing database records

By making a few modifications to the listview.asp page, you can use a loop to generate a table that displays the ID, name, email, status and dateCreated values for each record in the database.

Start by making a new page called main.asp. Make sure that the user is logged in. To do this, check for the cookie you set in the index.asp page. If it doesn't exist or is set to the wrong value, redirect the user to the login page. Next, the page needs to select all the records from the database. This is done exactly as it is in listview.asp. Create an ADODB connection object that acts as a bridge between our ASP page and the database. Then identify the file location of your database. Specify a driver to use to connect to your database, and finally, create an SQL command that selects all records from the database. These four steps set up all the information you need to create a new object known as a recordset.

A recordset is a database object that contains the results of an SQL query. It can be pictured as a table of rows similar to the table view in Microsoft Access. Each row is a record in the set and each column is a field containing data for each row. In an ASP page you can create a recordset object by using the Set command when calling the execute method on our database connection object. In listing 1 the recordset object is called rstemp.

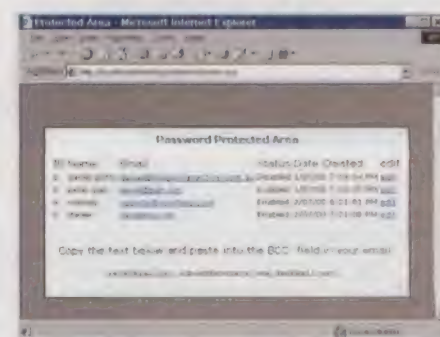
Once you have a recordset object in memory, you can move around it using what is called a cursor. This is very similar to moving a text cursor around in a text file. For example, in Windows Notepad you can move the cursor forwards and backwards using the arrow keys, and send it to the beginning or end of the text by using the Home or End keys. Similarly, in ASP you can move the recordset cursor around database records by calling methods such as moveNext, movePrevious and moveFirst.

In addition to moving the cursor around, you need to check its location periodically — for example, to see if you've reached the end of the recordset before trying to retrieve data from it. This is done by checking rstemp.EOF, where EOF stands for End of File, and main.asp also checks that the cursor is at the start of the recordset before running the loop. This is done by testing rstemp.BOF, or Beginning of File. During the ensuing loop, you need to move the cursor through the recordset row by

Make the administration of your database easier with ASP.

row. Do this by calling the moveNext method. At any point you can request the value of a field in the current record by using the syntax recordsetName("fieldName"). For example, if you need the email address of the current row, use rstemp("email"). An If...Then...Else statement has been used to display the status of each record as 'enabled' or 'disabled' rather than simply outputting a zero or one.

Once this loop has finished, the cursor is sent back to the start of the recordset and you output the email address list as you did in listview.asp before destroying the recordset and ADODB objects. There is one minor addition to last month's code: another If...Then statement which checks that the current record has a status of 1



▲ Figure 1: A detailed display of your database records

before displaying the email address. The code for this is in main.asp, and the resulting page is shown in figure 1.

Editing the records

The records displayed in main.asp each have a link created to a page called database_edit.asp. These links also send a querystring variable in the URL which identifies the database record you wish to edit, as in the following example:

http://localhost/maillinglist/admin/database_edit.asp?id=2

The question mark after the page name indicates that parameters are being passed from this page to the next. In this case, there is only one parameter, called id, with a value of 2. So, to begin with, create a new page in the admin folder called database_edit.asp and add the login check code. Now that this page is password protected, you can check the value of the id parameter and retrieve this record from the database. This is done using an SQL statement like the following:

[pb] *pocketbooks*



Master the Web
On sale September



Master the penguin
On sale October

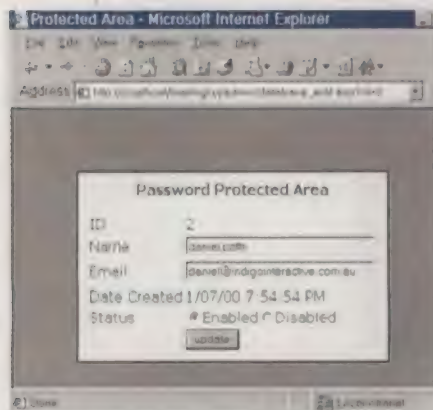
MASTER THE ART

Available at newsagencies or online at
www.pocketbooks.net.au


```
SQLcommand = "select * from mailingList
where id = " & request.item("id")
```

Previously, you selected all records from the database, but here you restrict the query to those which meet certain criteria. Your database is configured so that the ID field is the primary key, so you know there can only ever be one record with any given ID value. Consequently, this statement will only ever select one record. Once you have this recordset object, you need to make sure it is valid by checking that it is not at EOF. Then you can use it to populate a form not unlike that used in `subscribe.asp`. The difference is that you dynamically set the value of each form field you want to make editable — in this case name, email and status. An If...Then...Else statement is used to check the value of the current record's status and output radio buttons that reflect that value. The form as seen in the browser is shown in figure 2. You also need to send the record's ID to the `edit_action.asp` page so that it knows which record to update. This is done using a hidden form field.

All that's left to do now is create the page that performs the update request. Create a new file in the admin directory called `edit_action.asp` (this is the file



▲ Figure 2: The form to update a database record

name given as the action in the form on `database_edit.asp`). First, protect this page with the cookie check code. Next, you need to perform a third type of SQL command called an UPDATE to modify an existing record with information from the `database_edit.asp` form. This is a pure script file with no HTML embedded in it. Once the update has been performed, redirect the browser to `main.asp` where the updated record will be displayed in the list of records. Your update SQL command will look something like

Listing 1: Checking login status

```
<%
if request.cookies("logged_in") <> "1" then
    response.redirect("index.asp")
end if
%>
```

Listing 2: Dynamic table generation

```
<%
set conn = createobject("adodb.connection")

DSN = "DRIVER={Microsoft Access Driver (*.mdb)};"
DSN = DSN & "DBQ=C:\inetpub\database\mailingList.mdb"
conn.Open DSN

SQLcommand = "select * from mailingList"

set rstemp = conn.execute(SQLcommand)
if not rstemp.BOF then
    rstemp.moveFirst
end if

response.write("<table><tr><td>ID</td><td>Name</td><td>Email</td><td>Status</td><td>Date Created</td></tr><tr><td><td>edit</td></tr></tr>")
do until rstemp.eof
    response.write("<tr>")
    response.write("<td><font size=2>" & rstemp("id") & "</td>")
    response.write("<td><font size=2>" & rstemp("name") & "</td>")
    response.write("<td><font size=2><a href=" & rstemp("email") & "</a></td><td><font size=2>" & rstemp("email") & "</a></td><td><font size=2>" & rstemp("status") & "</td>")
    if rstemp("status") = 1 then
        response.write("<font size=2>Enabled")
    else
        response.write("<font size=2>Disabled")
    end if
    response.write("</td><td><font size=2>" & rstemp("dateCreated"))
    response.write("</td><td><font size=2>")
    response.write("<a href=" & rstemp("database_edit.asp?id=" & rstemp("id") & "</a></td></tr>")
    response.write("</tr>")
    rstemp.movenext
loop
response.write("</table>")
%>
```

For the complete code for all the pages used here, as well as the sample mailing list database, check this month's cover CD.

the following, but you will use the `request.item()` function to set the values dynamically.

```
UPDATE mailingList SET name = 'Daniel
Potts',
status = 0,
email = 'daniel@indigointeractive.com.au'
where id = 2
```

Summing up

Now you have a complete online database utility that can be adapted to handle any type of information. Next month, we'll end our in-depth look at ASP with ways of adding email functions to a site.

Daniel Potts

For a complete archive of APC Insite columns, see apcmag.com.

Daniel Potts can be contacted at daniel@indigointeractive.com.au.

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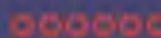
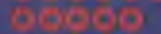
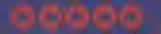

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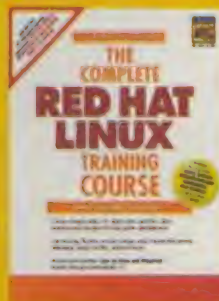


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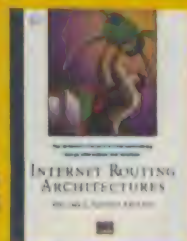
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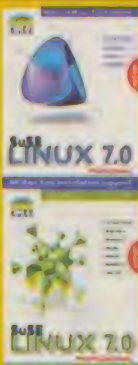
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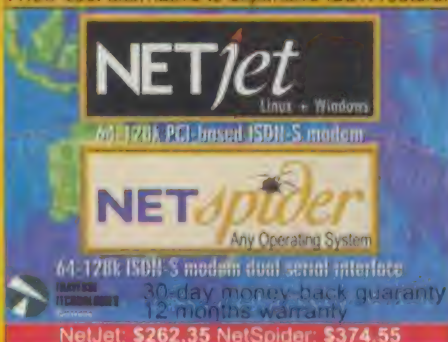
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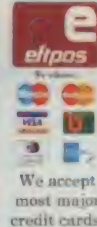
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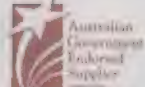
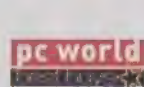
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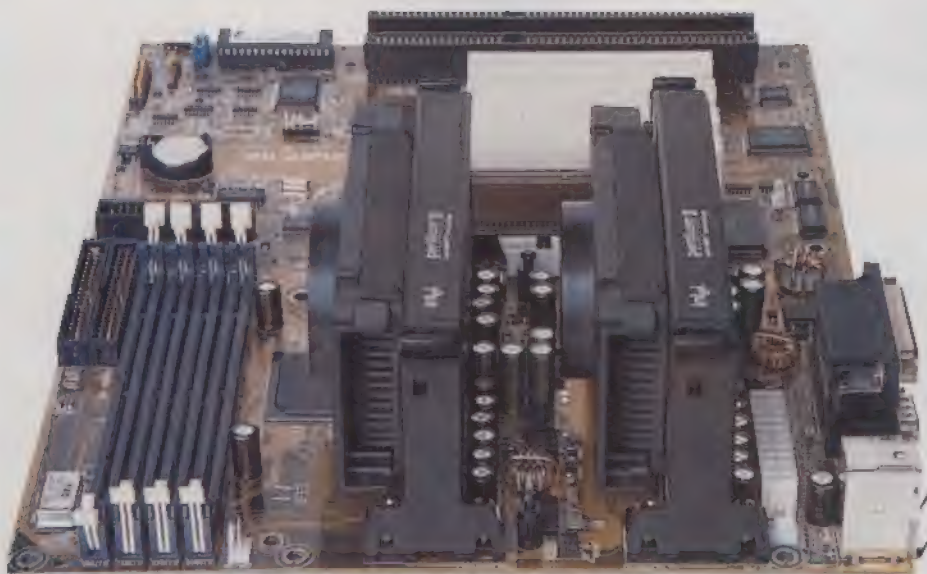


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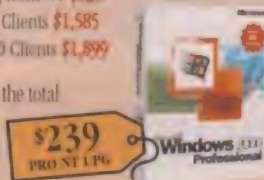
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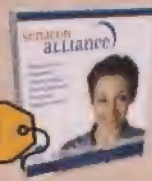


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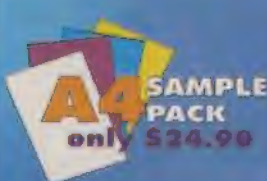
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DELIVERY
AUSTRALIA WIDE**

Paper & Media

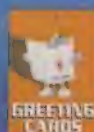


SUPERIOR QUALITY AT AFFORDABLE PRICES

Product Code	Description	Sheets	Price	Price per Sheet
A4HRP	A4 90gsm Hi-Res Paper	100	\$ 15.00	0.15
A3HRP	A3 90gsm Hi-Res Paper	100	\$ 30.00	0.30
A4WF	A4 White Film 100mu	50	\$ 47.00	0.94
A3WF	A3 White Film 100mu	50	\$ 90.00	1.80
A4CF	A4 Clear Film 100mu	50	\$ 39.00	0.78
A3CF	A3 Clear Film 100mu	50	\$ 71.00	1.42
A4FGP	A4 Full Gloss Photo Paper	50	\$ 44.00	0.88
A3FGP	A3 Full Gloss Photo Paper	50	\$ 79.00	1.58
A4PH	A4 Economy Photo Paper	50	\$ 23.00	0.46
AC2	Artists Canvas	25	\$ 60.00	2.40
GC4F	Greeting Card (4 Fold)	100	\$ 26.00	0.26
GC8F	Greeting Card (8-Fold)	100	\$ 48.00	0.48
DCCS	Double Coated Card Stock	50	\$ 24.00	0.48
GCS	Glossy Card Stock	50	\$ 24.00	0.48
TTP	T-Shirt Transfer Paper	15	\$ 15.00	1.00
MP	Magnetic Paper	25	\$ 58.00	2.32
BC1	Business Cards (10 per A4)	20	\$ 19.00	0.95



INCLUDES:
Glossy coated paper,
bright film paper,
white film,
clear film,
full gloss photo paper,
economy photo paper,
greeting card (4 fold),
greeting card (8-fold),
glossy card stock,
label transfer paper,
business card,
and magnetic paper!



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SUPERIOR PERFORMANCE Inkjet Refill Kits



REFILL & SAVE AT LEAST 80% OFF PRINTING COSTS

BLACK INKJET REFILL KITS FROM ONLY - \$29.90

BLACK KITS INCLUDE SUPERIOR, DENSE & SHARP BLACK INK!!

DESCRIPTION (Kits Compatible with Printers listed below)

CANON BJ-30
CANON BJC-70/BJC 80
CANON BC-01/02/BJ-10E/20/200/BJC-210/240/255/265/1000
CANON BJ-300/330
CANON BJC-600/610/620
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BC-20
CANON BJC-3000/6000/6500/8000
CANON BJC-7000 Series
HP Desk Jet 400/500 Series
HP Desk Jet 600/660/690 Series
HP Desk Jet 700/800/900/1000/1000i Series
HP Deskjet 300 Series & Olivetti JP's!
EPSON Stylus 400/800/800+1000
EPSON Stylus Colour /PRO/XL
EPSON Stylus 820/colour II/Is
EPSON Stylus Colour 200/300/400/500/600/800/850/1520
EPSON Stylus Colour 440/460/480/640/660/700/740/760/900
IBM/LEXMARK 4076/1000/1020/2000/2030/2050 Series
IBM/LEXMARK 5000/5700/7000 & Z Series
BROTHER 7160/9100C
CANON, EPSON, HP Fluorescent & Photo Realistic Kits!

No. of Refills

Kit Code



60 20-BKL
60 21-BKL
6 3-BKL
7 4-BKL
16 5-BKL
45 19-BKL
9 18-BKL
6 46-BKL
6 43-BKL
6 8A-BKL
6 8B-BKL
6 29-BKL
8 7-BKL
8 1-BKL
8 2-BKL
12 23-BKL
12 33A-BKL
12 33B-BKL
6 35A-BKL
6 35B-BKL
8 49-BKL
Please Call!



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COLOUR KITS INCLUDE CYAN, MAGENTA & YELLOW INKS!!

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CANON BJC-210/210SP/240/255/265/1000
CANON BJC-600/610/620
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21
CANON BJC-3000/6000/8000 Series
CANON BJC-7000 Series
HP Colour Desk Jet 300/400/500 Series & Olivetti!
HP Colour Desk Jet 600C/660C/690C Series
HP Desk Jet 850C/855C/870C/1000C Series
HP Desk Jet 710/720/890/900 Series
EPSON Stylus Colour /PRO/XL
EPSON Stylus 820/colour II/Is
EPSON Stylus Colour 200/300/400/500/600/800/850/1520
EPSON Stylus Colour 440/460/480/640/660/700/740/760/900
IBM/LEXMARK 4076/1000/1020/2000/2030/2050 Series
IBM/LEXMARK 5000/5700/7000 & Z Series
BROTHER 7160/9100C
CANON, EPSON, HP Fluorescent & Photo Realistic Kits!
New!! Epson Photo 750/1200 & Canon Photo 7100 Refill Kits!

No. of Refills

Kit Code

3x30 22-CLR
3x12 25-CLR
3x8 10-CLR
3x30 17-CLR
3x6 47-CLR
3x6 44-CLR
3x12 14A-CLR
3x12 14B-CLR
3x3 30A-CLR
3x3 30B-CLR
3x4 16-CLR
3x12 24-CLR
3x12 34A-CLR
3x12 34B-CLR
3x6 36A-CLR
3x6 36B-CLR
3x6 50-CLR
Please Call!



Your printer not listed? We stock Australia's largest range of printer consumables. Call now!



USING NEW REALITY'S INKJET REFILL KITS WILL NOT VOID YOUR PRINTER'S WARRANTY.

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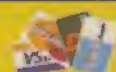


ALL PRICES INCLUDE GST

**AUSTRALIA WIDE FREECALL
1800 680 605**

New Reality Resources Pty. Ltd. ACN - 073 908 013
Australia Wide FREECALL - 1800 680 605
QLD Phone - (07) 3245 2411 Fax - (07) 3245 2755
VIC Phone - (03) 9878 8288 Fax - (03) 9878 3933
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Shop 1 / 70 Redland Bay Road
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Entry level Workstation
The multipurpose Worker

- ♦ Mini Tower or Desktop case
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- ♦ 1.44 floppy disk drive
- ♦ LG 15 SVGA Colour Monitor
- ♦ Integrated dynamic 3D Graphics card
- ♦ 48X LG CDROM drive
- ♦ 56K V.90 Internal Modem
- ♦ 128bit sound built in
- ♦ 120 Watt speakers
- ♦ Windows keyboard
- ♦ Microsoft mouse & mat
- ♦ Windows 98 SE + Lotus Smartsuite

	Full Price	Weekly
Pentium II Celeron 566	\$1476.00	\$15.23
Pentium II Celeron 600	\$1586.00	\$16.38
Pentium II Celeron 633	\$1665.00	\$17.31
Pentium II Celeron 667	\$1743.00	\$17.77
Pentium II Celeron 700	\$1823.00	\$18.92

We also Supply AMD Athlon Processor based Systems. Call for prices

SENATOR

The Versatile Computer
from workstation to file server

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- ♦ ATX Mainboard
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- ♦ 20Gb Ultra IDE hard drive
- ♦ 1.44 floppy disk drive
- ♦ LG 775N 17 SVGA Colour Monitor
- ♦ 32Mb TNT2 AGP Graphics card
- ♦ 48X LG CDROM drive
- ♦ 56K V.90 Internal Modem
- ♦ SB128 Sound Card
- ♦ 800 Watt PMPO speakers
- ♦ Windows keyboard
- ♦ Microsoft mouse & mat
- ♦ Windows 98 SE + Lotus Smartsuite

	Full Price	Weekly
Pentium III 650	\$2183.00	\$22.38
Pentium III 667	\$2255.00	\$23.54
Pentium III 700	\$2297.00	\$24.00
Pentium III 733	\$2344.00	\$24.50
Pentium III 750	\$2384.00	\$24.92
Pentium III 800	\$2477.00	\$24.69
Pentium III 866	\$2723.00	\$27.00
Pentium III 933	\$3275.00	\$32.54

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File servers
Technology at its best

- ♦ Full Tower Server case
- ♦ ATX Mainboard supports dual processors
- ♦ Up to 10 Drives supported in the case
- ♦ 256Mb SDRAM
- ♦ 45Gb 7200rpm UDMA 100 IDE HD
- ♦ 1.44 floppy disk drive
- ♦ LG 15 SVGA Colour Monitor
- ♦ 4Mb AGP Graphics card
- ♦ 48X LG CDROM drive
- ♦ 10/100 PCI Netgear network card
- ♦ Windows keyboard
- ♦ Microsoft mouse & mat

System Price with One Processor Fitted

	Full Price	Weekly
Pentium III 650	\$3163.00	\$31.38
Pentium III 667	\$3177.50	\$31.99
Pentium III 700	\$3213.00	\$32.08
Pentium III 733	\$3299.00	\$32.54
Pentium III 750	\$3377.00	\$33.46
Pentium III 800	\$3486.00	\$33.92
Pentium III 866	\$3880.00	\$36.92
Pentium III 933	\$4495.00	\$41.54

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at a flicker free 75Hz



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- High Performance Disc Mechanism for High-Speed Recording / Play
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Computer Parts and Accessories

CPU's

Intel

Celeron 566	\$250
Celeron 600	\$290
Celeron 633	\$350
Pentium III 667EB	\$414
Pentium III 700E	\$450
Pentium III 733EB	\$470
Pentium III 750E	\$565
Pentium III 800E	\$630

AMD

Athlon 600	\$245
Athlon 680	\$280
Athlon 700	\$340
Athlon 750	\$370
Athlon 800	\$410
Athlon 850	\$520
Athlon 900	\$600
Athlon 950	\$750
Duron 600	\$160
Duron 650	\$190
Duron 700	\$250
CPU Fan	\$30

MEMORY

64MSDRAM	\$140
128MSDRAM	\$280

Hard Disk's - IDE

Seagate

U10 10GB	\$160
U10 20GB	\$200

7200 RPM

Barracuda 15GB	\$230
Barracuda 20GB	\$280
Barracuda 30GB	\$340

Western Digital

Caviar 15GB	\$225
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Caviar 20GB \$270

MAINBOARDS

Pentium II / III

ASUS P3V-4X	\$220
ASUS CUV-4X	\$230
Abit BE6-II	\$240

GIGABYTE

GA-6VXE7+	\$155
GA-6VXC7-4X	\$180
GA-6VX7-4X	\$190
GA-6BXC	\$170
GA-6BX7	\$190
GA-6WMMC7	\$180
GA-BX2000+	\$230

MSI

MSI-6309	\$170
MSI-6178	\$180

AOpen

AX63	\$140
AX63 PRO	\$170
AX6BC	\$170
AX6BC PRO	\$195
AX64 PRO	\$210

PROTAC

Xcel 2000	\$160
M754LMR	\$180
M758LMR	\$165

Lucktech BX3(AT)	\$160
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AMD Athlon

Gigabyte 71XE	\$240
MSI 6195	\$240
ASUS K7V-T	\$320

Pentium (socket 7)

Gigabyte 5AA	\$150
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Video cards & Add-ons

4M 3D PCI	\$50
4M 3D AGP	\$45
8M AGP	\$60
8M AGP with TV output	\$80
16Mb S3 SAVAGE4 AGP	\$90
16Mb TNT2 AGP	\$100
32Mb TNT2 AGP	\$140
32Mb TNT2 with TV out (AGP or PCI)	\$180
32Mb TNT2 with TV out video in (AGP)	\$190
Matrox G400 32Mb Dual head	\$337
Matrox G400 MAX 32Mb	\$460

ASUS

V3800 RIVA TNT-2 16Mb	\$170
V6600 GeForce 32Mb Delux with TV out	\$447
V6800 GeForce 32Mb Pure	\$440
V6800 GeForce 32Mb Deluxe, DDR	\$530
V7700 GeForce 32Mb Pure, DDR	\$660
V7700 GeForce 32Mb Deluxe, DDR	\$720
Creative GeForce 32Mb IIGTS	\$640
Gigabyte GeForce 2560 AGP 32Mb	\$370
Power Colour GeForce AGP 32Mb	\$330
Voodoo II PCI 12Mb PCI	\$140
Voodoo III 3000 AGP 16Mb TV out	\$240
Voodoo III 3000 AGP 16Mb	\$210
Dynalink TV Tuner & Capture card	\$120

Pixelview Video Conferencing kit (TV pack with CCD Digital Camera)	\$200
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CD WRITERS

Diamond Data DD6430A 30x6x4 IDE RW	\$350
Diamond Data DD8430A 30x8x4 IDE RW	\$380
LG CED-80808 32x8x4 IDE RW	\$360
Panasonic 20x8 SCSI Kit (Scsi card & S/W)	\$400
Panasonic 7585 32x8x4 IDE CD RW Kit	\$400
Sony CRX140E 32x8x4 IDE RW oem	\$370
Sony CRX145E 32x10x4 IDE RW Retail	\$440
Sony CRX145SBK 32x10x4 SCSI kit (w S/W)	\$540
Acer 84321A 32x8x4 IDE RW	\$400
Ricoh MP7063A 32x6x4 IDE rewriter Kit	\$340
Ricoh MP7080A 32x8x4 IDE rewriter Kit	\$420

Ricoh MP9060A 24x6x4 IDE DVD&CDRW	\$600
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Printers

EPSON

Stylus 480	\$155
Stylus 670	\$280
Stylus 760	\$410
Stylus 900 (12ppm)	\$655
Photo 720	\$420
Photo 870	\$610
Photo 1270 (A3)	\$845

Canon

BJC1000SP	\$118
BJC2100SP	\$155
BJC3000SP	\$240
BJC7100	\$450
BJC5100 (A3)	\$320
BJC6200	\$340
BJC6500 (A3)	\$590
Laser LBP800 (8ppm)	\$490

hp

HP 640C	\$185
HP 810C	\$280
HP 930C	\$380
LaserJet 1100 (8ppm)	\$700

Panasonic KX6100 Laser (6PPM)	\$305
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Scanners

Artec Ultima 2000	\$120
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Acer

340P Vuego	\$100
640U Vuego	\$135
620S Vuego	\$150
640UT Vuego	\$285
Canon FB330P	\$120
Canon FB630P	\$160
Canon N650U	\$200
Canon FB620S	\$240

HP 3300C	\$195
HP 4200C	\$240
HP 5300C	\$470
HP 6300C	\$690

Sound Cards

ISA / PCI Sound	\$25
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Sound BLASTER

PCI 128 oem	\$45
Live oem	\$105

Modems

56K Internal	\$55
56K Internal with sound card	\$60
Netcomm 56K Int.	\$65
56K External	\$90
56K USB Modem	\$100
Netcomm 56K Ext. (USB / Com)	\$195
U.S Robotics 56K Ext.	\$180
PCMCIA 56K	\$140

NETWORKING

Network card 10Mb	\$22
Network card 100Mb	\$30
5 Port Hub 10Mb	\$60
8 Port Hub 10Mb	\$64
5 Port Hub 100Mb	\$150
8 Port Hub 100Mb	\$200
USB Hub 4 port	\$70
Printer Switch 2 In 1	\$25

Interface Cards

PCI SCSI II card	\$65
PCI USB ports card	\$45
ISA Printer card	\$25

Blank CD's

Kodak silver / LG	\$1.5
Ricoh/Mitsui/TDK	\$2
80 min Laser / Kodak	\$2.2
Rewritable CD Laser	\$4

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- 64MSDRAM PC133
- 10GB HDD
- 1.44M Flop.
- 8M Video card
- 3D Sound card
- 48x CD Rom
- 15" SVGA Monitor
- 180W Speakers
- Midi ATX case
- Win98 Keyboard
- A4 Mouse & Pad
- Windows98 SE CD

Celeron 566	\$1370
Celeron 600	\$1410
Pentium III 667	\$1580
Pentium III 733	\$1650
Pentium III 750	\$1750
Pentium III 800	\$1830

Athlon series

- 64MSDRAM PC133
- 10GB HDD
- 1.44M Flop.
- 8M Video card
- 3D Sound card
- 48x CD Rom
- 15" SVGA Monitor
- 180W Speakers
- Midi ATX case
- Win98 Keyboard
- A4 Mouse & Pad
- Windows98 SE CD

Duron 600	\$1390
Duron 700	\$1490
Athlon 600	\$1490
Athlon 700	\$1590
Athlon 800	\$1680
Athlon 900	\$1890

Value series

- 64MSDRAM PC133
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- 8M Video card built in
- PCI 3D Sound card built in
- 56K Modem built in
- 48x CD Rom
- 15" SVGA Monitor
- 180W Speakers
- Midi ATX case
- Win98 Keyboard
- A4 Mouse & Pad
- Windows98 SE CD

Celeron 566	\$1270
Celeron 600	\$1310
Pentium III 650	\$1480
Pentium III 700	\$1530
Pentium III 800	\$1700

Software

Windows 98 oem Full	\$170
Windows 2000 oem Full	\$250
MS WorkSuite 2000 oem	\$140
MS Office 2000	
Small business oem	\$370
MS Office 2000 oem	
Professional Full	\$500

SYSTEM OPTIONS

Monitors

15" Acer 54eL	\$260
15" Samsung 55E	\$260
15" LG 520SI	\$260
15" Mitsubishi Diamond View	\$260
17" Targa / Proviv	\$360
17" Acer 77C	\$395
17" Diamond View 1770f	\$395
17" LG 775N	\$395
17" Samtron 75E	\$395
17" LG 795SC (0.26)	\$430
17" Hitachi CM615ET	\$420
17" Diamond View 1772ie	\$480
17" Sony CPDE200	\$700
19" LG 995E	\$795
19" Hitachi CM715 (0.22)	\$910
19" Sony CPDG400	\$1290
15.1" TFT LCD LG	\$1550

CD Rom / DVD Rom

48x CDRom	\$70
48x or 50x or 52x CDRom	\$80
DVD 8x Panasonic	\$215
DVD 12x Samsung	\$250
DVD 12x Creative	\$250
DVD 16x Aopen Kit	\$260
DVD 16x Pioneer	\$260

Speakers

180W SPKs.	\$15
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480W SPKs.	\$30
400W Sub-Woofer SPKs.	\$70
980 Watt Sub-Woofer SPKs.	\$90
Creative FPS1000 4 point	\$185

Mouse

A4 PS/2 & Serial	\$8
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Logitech

PS/2 Mouse	\$15
Wheel Mouse (PS/2&USB)	\$30
Cardless Wheel Mouse	\$85

Microsoft

Intelli. Mouse (PS/2)	\$35
Intellieye Mouse	\$65
Intellieye Mouse Optical	\$80
Intellimouse Explorer	\$85

Keyboards

Win98 KB (AT&PS/2)	\$15
Acer KB (AT&PS/2)	\$20
Multimedia KB (AT)	\$25
Internet KB (PS/2 or AT)	\$35
Logitech Internet KB (PS/2)	\$45
Logitech Cordless Touch	\$165
Honeywell Space mate KB	\$42
Honeywell Multimedia KB	\$65
MS Internet / Natural KB	\$50
Wireless k/b with mouse point	\$100

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120W Amplified 240V Speakers
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1MB PCI Video Card
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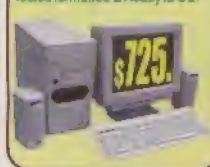


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Pentium SONO Explorer

With MMX power to run databases, all your accounting or even create your own web page the SONO is the pick of the crop! With new minitower, keyboard, mouse and CD ROM the whole family will enjoy full multimedia applications!

Includes:
Genuine Intel Pent 166MMX CPU
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1.2GB IDE Hard Disk Drive
16 Bit Stereo Sound Card
120W Amplified 240V Speakers
32 X IDE CD ROM Drive
1MB PCI Video Card
15" SVGA Colour Monitor
56K V.90 Int Fax/Modem
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This is a Big Mac with the Lot! Whether a student or office the only this you need is a power point.

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32MB RAM exp to 256MB
3.5", 1.44MB Floppy Disk Drive
1.0GB IDE Hard Disk Drive
16 Bit Stereo Sound Card
120W Amplified 240V Speakers
IDE CD ROM Drive
1MB PCI Video Card
15" SVGA Colour Monitor
56K V.90 Int Fax/Modem
100 Free Internet Hours
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Attractive Desktop Case
101 Key Keyboard & Serial Mouse
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Installed Plus all drivers loaded
Tested, formatted & Ready to GO!



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Pentium Starter Pack

Unsure if Computing is for you? This PC will give you enough power for all your initial needs, even the Net without spending \$2K!

Includes:
Genuine Intel Pent 100MHz CPU
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16MB RAM exp to 256MB
3.5", 1.44MB Floppy Disk Drive
850MB IDE Hard Disk Drive
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Attractive Desktop Case
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Windows 3.1, PC DOS 7 & Internet Explorer CD ROM & Manual
Tested formatted & Ready to GO!



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Buy it separately and you'll spend over \$1,800.00.
A.C.R Price \$1118
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Less \$200 GST Voucher!



\$1030.

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Unlike it's little brother the G-Force, this boasts an AMD K6-2 400MHz CPU that bench tests favorably against the Intel Pentium II 400 processor. For the person who has every new electronic gadget the Power House won't disappoint no matter what your application! This is the V8 of the A.C.R. PC system line up so put the metal to the pedal and hang on!

Includes:
AMD K6-2 400MHz CPU
Pentium ATX TX Mainboard
64MB RAM exp to 512MB
6.4GB IDE Hard Disk Drive
32 X IDE CD ROM Drive
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56K V.90 Internal Modem
Sound Blaster Vibra 16 Sound Card
ATX Midi Tower Case
PS/2 Win '95/98 Keyboard & Mouse



\$999.

DIY Upgrade Kits

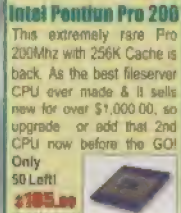
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- DIY Pentium 166MMX Upgrade Kit** **\$273.00**
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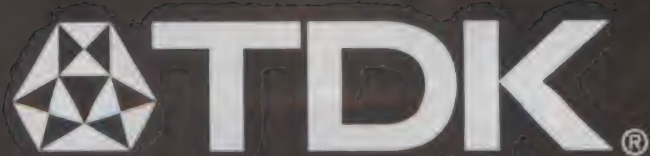
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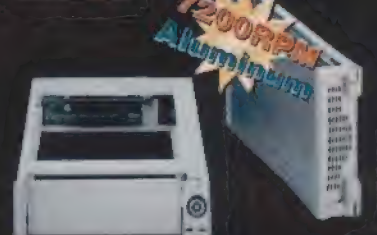
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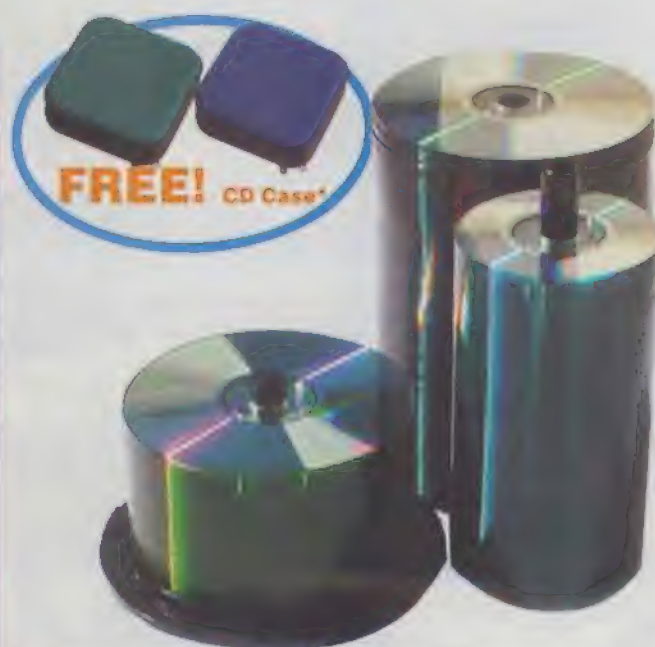
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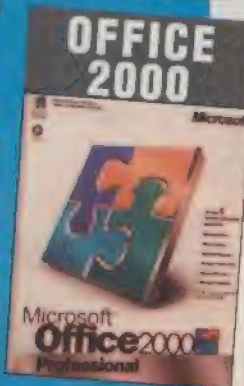
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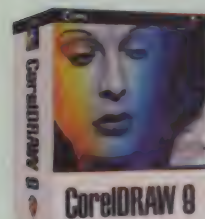
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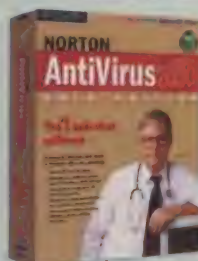
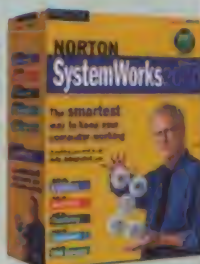
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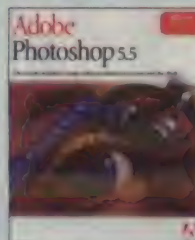
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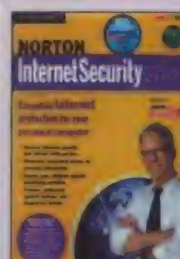
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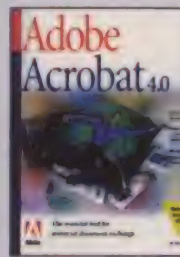


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REFILL & SAVE AT LEAST 80% OFF PRINTING COSTS

BLACK

INKJET REFILL KITS FROM ONLY -

\$29.90

BLACK KITS INCLUDE SUPERIOR, DENSE & SHARP BLACK INK!!

DESCRIPTION (Kits Compatible with Printers listed below)
CANON BJ-30/BJC-70/BJC 80
CANON BC-01/02 BJ-10E/20/BJ-200/BJC-210/210SP/240/255
CANON BJ-300/ 330
CANON BJC-600/610/620
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BC-20
CANON BJC-3000/6000/6500
HP Desk Jet 400/500 Series
HP Desk Jet 600/660/690 Series
HP Desk Jet 700/850C/855C/870C/890C/1000C Series
HP Deskjet 300 Series & Olivetti JP's!
EPSON Stylus Colour 400/800/800+/1000
EPSON Stylus Colour iPRIO/XL
EPSON Stylus 820/colour i111a
EPSON Stylus Colour 200/300/400/500/600/800/850/1520
EPSON Stylus Colour 440/460/640/660/700/740/760/900
IBM/LEXMARK 4078/1000/1020/2000/2030/2050 Series
IBM/LEXMARK 5000/5700/7000 & Z Series
CANON, EPSON, HP Fluorescent & Photo Realistic Kits!

No. of Refills
60
9
7
18
45
9
6
6
6
8
8
12
12
12
6
6
12

Kit Code
21-BKL
3-BKL
4-BKL
5-BKL
19-BKL
18-BKL
46-BKL
88-BKL
29-BKL
7-BKL
1-BKL
2-BKL
23-BKL
33A-BKL
33B-BKL
35A-BKL
35B-BKL
Please Call!



COLOUR

INKJET REFILL KITS FROM ONLY -

\$39.90

COLOUR KITS INCLUDE CYAN, MAGENTA & YELLOW INKS!!

DESCRIPTION (Kits Compatible with Printers listed below)
CANON BJC-70/80
CANON BJC-210/210SP/240/255
CANON BJC-600/610/620
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21
CANON BJC-3000/6000/6500
HP Colour Desk Jet 300/400/500 Series & Olivetti
HP Colour Desk Jet 600C/660C/690C Series
HP Desk Jet 850C/855C/870C/1000C Series
HP Desk Jet 710/720/890 Series
EPSON Stylus Colour iPRIO/XL
EPSON Stylus 820/colour i111a
EPSON Stylus Colour 200/300/400/500/600/800/850/1520
EPSON Stylus Colour 440/460/640/660/700/740/760/900
IBM/LEXMARK 4078/1000/1020/2000/2030/2050 Series
IBM/LEXMARK 5000/5700/7000 & Z Series
CANON, EPSON, HP Fluorescent & Photo Realistic Kits!
New!! Epson Photo 750/1200 & Canon Photo 7100 Refill Kit!

No. of Refills
3x30
3x12
3x8
3x30
3x30
3x4
3x12
3x12
3x3
3x3
3x4
3x12
3x12
3x12
3x6
3x6
12/Colour

Kit Code
22-CLR
25-CLR
10-CLR
17-CLR
47-CLR
14A-CLR
14B-CLR
30A-CLR
30B-CLR
16-CLR
24-CLR
34A-CLR
34B-CLR
36A-CLR
36B-CLR
Please Call!



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MOTHERBOARDS SUPER SOCKET 7	Retail	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	EPSON STYLUS PHOTO 1270 A3+ 1/8"	\$95	SONY MVC-F605 200M DIG CAMERA	\$1,337
PC100 SUPER SOCKET 7 MB M5561MR 100MHz	\$143	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,014
PENTIUM EPX APOLLO AT MPP352 USB	\$154	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
PENTIUM EPX APOLLO AT MPP352 USB	\$154	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
PENTIUM EPX APOLLO AT MPP352 USB	\$154	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
PENT III MOEBARD AT-ATX		ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
PENT III MB PC100 XCEL2000 AT M741MR	\$140	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
PENT III MB PC100 M741MR INT2	\$158	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
GIGABYTE GA-047+ VIA APOLLO 530 AT	\$184	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
ATHLON MB GIGABYTE GA7X AT 133MHz	\$264	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
ATHLON MB ASUS K7V+ AT 200MHz FSB	\$323	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
PENT III MB GIGABYTE GA7X AT 133MHz	\$264	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
PENT III MB ASUS CUBX2000H1+U330	\$315	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
PENT III MB ASUS CUBX2000H1+U330	\$315	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
CPU'S - SOCKET 7 - PENTIUM III		ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
CYRIX686 686Mhz 333 CPU M2 - MMX CPU	\$65	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
VIA CYRIX 500MHz 100MHz FSB	\$128	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
VIA CYRIX 500MHz 133MHz FSB	\$154	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
AMD K5-500 CPU 133MHz 30 NOW TECH	\$235	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
AMD ATHLON K7-3-600 30 CPU NEW SLOT A	\$345	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
AMD ATHLON K7-3-700 30 CPU NEW SLOT A	\$370	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
AMD ATHLON K7-3-750 30 CPU NEW SLOT A	\$395	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
AMD ATHLON K7-3-800 30 CPU NEW SLOT A	\$420	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
AMD ATHLON K7-3-900 30 CPU NEW SLOT A	\$445	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
AMD ATHLON K7-3-1000 30 CPU NEW SLOT A	\$470	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
CELEBRON 533A Mhz 5-370 CPU INTEL IN BOX	\$234	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
CELEBRON 566A Mhz 5-370 CPU INTEL IN BOX	\$240	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
COMPERNHE-CELLION PPGA CONVERTER	\$28	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
INTEL PIII 667/133MHz 256K AT FC-PGA	\$448	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
INTEL PIII 667/133MHz 256K AT FC-PGA	\$474	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
INTEL PIII 730/133MHz 256K AT FC-PGA	\$524	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
INTEL PIII 667/133MHz 256K AT FC-PGA	\$474	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
INTEL PIII 667/133MHz 256K AT FC-PGA	\$474	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
HARD DISK DRIVES 5.1 GIG - 20.4 GIG		ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
1.5 GIG IDE BUSLING HARD DISK 5400 RPM	\$142	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
7.5 GIG IDE BUSLING HARD DISK 5400 RPM	\$152	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
10.2 GIG SAMSUNG HD ULTRA 66 5400	\$159	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
10.2 GIG WESTERN DIGITAL ULTRA 66 5400	\$154	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
13.5 GIG WESTERN DIGITAL ULTRA 66 5400 RPM	\$170	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
15.3 GIG SAMSUNG HD ULTRA 66 5400	\$172	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
15.3 GIG WESTERN DIGITAL ULTRA 66 5400 RPM	\$175	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
15.3 GIG WESTERN DIGITAL ULTRA 66 7200 RPM	\$211	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
17.0 GIG SEAGATE ULTRA 66 5400 RPM	\$216	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
20.4 GIG SAMSUNG HD ULTRA 66 5400	\$212	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
20.5 GIG WESTERN DIGITAL ULTRA 66 5400 RPM	\$186	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
20.5 GIG WESTERN DIGITAL ULTRA 66 7200 RPM	\$216	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
20.4 GIG IBM HARD DISK DRIVE 7200 RPM	\$382	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
30.6 GIG SEAGATE HDISK DRIVE 7200 RPM	\$371	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
30.6 GIG SAMSUNG HD ULTRA 66 5400 RPM	\$226	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
30.6 GIG WESTERN DIGITAL ULTRA 66 5400 RPM	\$226	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
45 GIG WESTERN DIGITAL ULTRA 66 5400 RPM	\$302	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
PROMISE ULTRA 66 CONTROLLER PCI	\$302	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
PROMISE ULTRA 66 CONTROLLER PCI	\$105	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
VIDEO/3D VIDEO CARDS - 33 - TRIDENT		ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
IBM EDU AGP VIDEO CARD X2	\$43	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
8MB AGP VIDEO CARD TRIDENT / 33	\$68	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
8MB TRIDENT 6880 PCI VIDEO CARD	\$76	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
8MB EDU 33 AGP VIDEO CARD W-TV OUT	\$84	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
16MB RIVA TNT-2 VANTA 3D AGP VIDEO CARD	\$139	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
32MB RIVA TNT-2 VANTA 3D AGP VIDEO CARD	\$136	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
VIDEO/CAPTURE CARDS DIAMOND-MATROX		ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
32MB RIVA TNT2 M64 PCI VIDEO CARD	\$160	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
33 SAVAGE4 AGP 16MB VIDEO CARD	\$178	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
33 SAVAGE4 PRO 32MB PCI 32MB	\$196	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
DIAMOND VIDEO 7200 32MB OCM 320MHz	\$200	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
30FX VODD005 2000 PCL/AGP 16MB 143MHz OEM	\$211	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
30FX VODD005 5500 AGP 64MB VIDEO CARD	\$701	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
FLYVIDEO TV 30-TUNER-CAPTURE CARD-REM	\$136	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
MATROX MARVEL G-400 PLUS 16MB VID CAP/DET	\$102	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
MATROX MILLENNIUM G400 DUAL 32MB 300MHz OEM	\$259	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
MATROX MILLENNIUM G400 DUAL 32MB 300MHz P	\$244	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
MATROX MILLENNIUM G400 DUAL 32MB 300MHz P	\$246	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
G-SERIES G200/G400 RANDOM RUNDAL CAPTURE	\$360	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
SPECTRA 3000 TNT GeForce AGP 32MB TV OUT	\$421	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
SPECTRA 3000 DDR GeForce AGP 32MB TV OUT	\$492	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
VIDEO/3D VIDEO CARDS - 33 - TRIDENT		ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
IBM EDU AGP VIDEO CARD X2	\$43	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
8MB AGP VIDEO CARD TRIDENT / 33	\$68	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
8MB TRIDENT 6880 PCI VIDEO CARD	\$76	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
8MB EDU 33 AGP VIDEO CARD W-TV OUT	\$84	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
16MB RIVA TNT-2 VANTA 3D AGP VIDEO CARD	\$139	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
32MB RIVA TNT-2 VANTA 3D AGP VIDEO CARD	\$136	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
VIDEO/CAPTURE CARDS DIAMOND-MATROX		ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
32MB RIVA TNT2 M64 PCI VIDEO CARD	\$160	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
33 SAVAGE4 AGP 16MB VIDEO CARD	\$178	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
33 SAVAGE4 PRO 32MB PCI 32MB	\$196	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
DIAMOND VIDEO 7200 32MB OCM 320MHz	\$200	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
30FX VODD005 2000 PCL/AGP 16MB 143MHz OEM	\$211	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
30FX VODD005 5500 AGP 64MB VIDEO CARD	\$701	ASUS GF6000 256 32MB AGP-VINCO PURE	\$494	CANON BJC 610 A4 COLOR PHOTO	\$157	SONY MVC-F605 200M DIG CAMERA	\$1,051
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K2BK	6/9	K10CLR	12
K3BK	6	K22CLR	6
K3BK	6	K11CLR	6
K1BK	6/9	K9CLR	12
		K25CLR	6
K7BK	60	K1CLR	30
K8BK	7	K2CLR	12
K4BK	9	K3CLR	12
		K23CLR	6
K5BK	7		
K10BK	16	K3CLR	8
K11BK	12	K4CLR	4
K12BK	8/80	K5CLR	30
K12BK	60	K6CLR	30
K12BK	9	K5CLR	30
K27BK	9	K6CLR	30
K28BK	12	K35CLR	6
		K36CLR	6
K19BK	2	K24CLR	6
		K15CLR	6
K13BK	12	K20CLR	6/12
K16BK	12	K7CLR	6/12
K14BK	12	K6CLR	12
K15BK	6	K6CLR	6
K17BK	12	K20CLR	6/12
K17BK	12	K6CLR	6
K17BK	12	K17CLR	6/12
K21BK	3	K34CLR	3
K25BK	12	K16CLR	6/12
K5BK	12	K15CLR	6/12
K6BK	12	K35CLR	6
		K33CLR	9/12
K18BK	6	K13CLR	12
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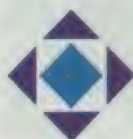
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HP Deskjet 600 Series	51649A	3x10	13XX
HP Deskjet 800 Series/1600c	51641A	3x6	11XX
Epson Stylus 200/500	S020097	3x10	19XX
Epson Stylus Colour/ProXL	S020036/66	3x8/2	21XX
Epson Stylus 820/11/11s	S020049	3x10	19XX
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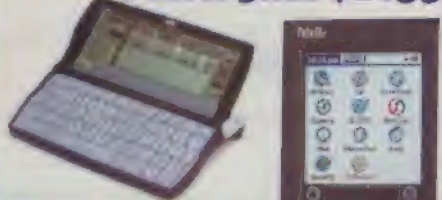
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CANON BJC 3000/6000	4	C19
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HP DESKJET 720/890/Officejet 1130	6	H13
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CANON BJC 7000	6	C16
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HP DESKJET 820C/850C/855C/870C/1000C	6	H7
HP DESKJET 720/890/Officejet 1130	4	H14
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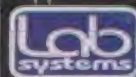
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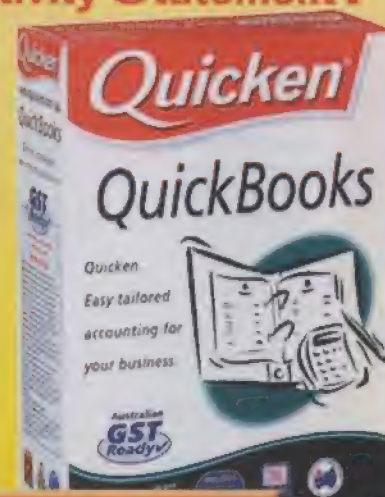
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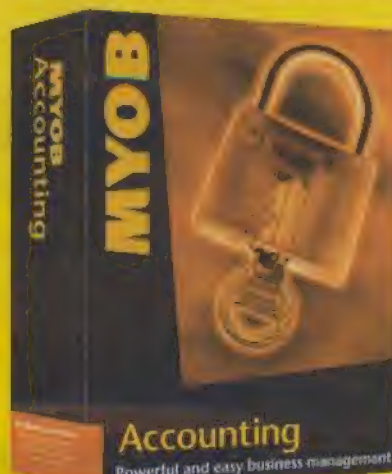
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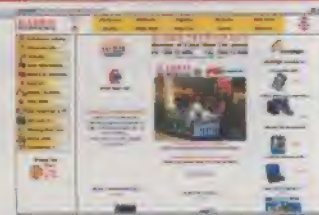
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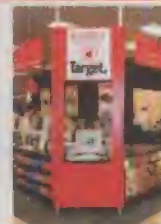
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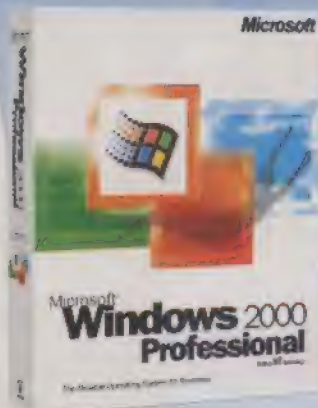
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Mic & Spkr	Speakers	Speakers
Port replicator	No	No
Select bay	No	No
DVD capable	No	Inc 8xDVD
Weight	3.17 kg	3.17 kg
Warranty	1 Year	1 Year
56K v.90 modem	Yes	Yes
RENT*	\$31.56	\$35.28
GST Ex + GST	\$2,926 + \$292.60	\$3,271 + \$327.10
GST INC	\$3,218.60**	\$3,598.10**
With Windows 98SE	(A2849)	(A2851)

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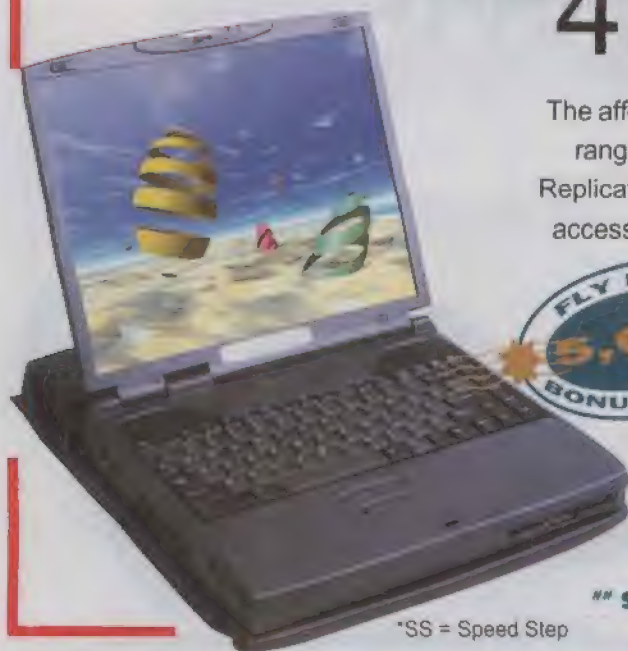
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Satellite Pro 4310XCDT



The affordable high performance mobile computer. With a range of expansion capabilities, including optional Port Replicator for easy connection to desktop peripherals and accessories, Satellite Pro is the perfect, no-compromise solution for business professionals.



GST Ex \$3,453 + GST \$345.30
(A2854) GST INC

\$3,798.30**

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*SS = Speed Step



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Toshiba Install Options

For a small extra charge we can install your chosen options into your new Toshiba: a modem, call for more information.



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Compare Satellite Pro Models

	Satellite Pro 4310XCDT	Satellite Pro 4320XDVD	Satellite Pro 4360XDVD	Satellite Pro 4380XDVD
Processor	Celeron 600MHz	Pentium III 600MHzSS*	Pentium III 700MHzSS*	Pentium III 750MHzSS*
RAM Std/Max	64/320 MB	64/320 MB	64/320 MB	64/320 MB
Hard Disk	6GB	12GB	12GB	12GB
Screen	13.3" TFT	14.1" TFT	14.1" TFT	14.1" TFT
CD-ROM	24xCD-ROM	No	No	No
Mic & Spkr	Yes	Yes	Yes	Yes
Port replicator	Optional	Optional	Optional	Optional
Video Ram	8Mb	8Mb	8Mb	8Mb
DVD capable	No	Inc 6xDVD	Inc 6xDVD	Inc 6xDVD
Weight	3.17 kg	3.17 kg	3.17 kg	3.17 kg
Warranty	1 Year	1 Year	1 Year	1 Year
56K V.90 modem	Yes	Yes	Yes	Yes
RENT*	\$37.25	\$44.52	\$46.66	\$52.84
GST Ex + GST	\$3,453 + \$345.30	\$4,331 + \$433.10	\$4,654 + \$465.40	\$5,270 + \$527.00
GST INC	\$3,798.30** (A2854)	\$4,764.10 (94178)	\$5,119.40 (A2995)	\$5,792.00 (A2856)
With Windows 95/98				
RENT*	\$37.27	\$45.26	\$49.13	\$54.50
GST Ex + GST	\$3,626 + \$362.60	\$4,514 + \$451.40	\$4,900 + \$490.00	\$5,436 + \$543.60
GST INC	\$3,988.60** (A2855)	\$4,965.40 (94179)	\$5,390.00 (A2996)	\$5,979.60 (A2857)
With Windows 2000/NT4				



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Pentium® III
available in
some Tecra's



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A2869, A2864
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The Best Performance at the Best Price

Tecra 8100

DVD

- Intel Celeron 600MHz
- 14.1" TFT
- 64MB RAM
- 6GB HDD
- 6 x DVD
- 3 Year Warranty

Styled for consistent mobile performance, the Tecra 8100 series provides you with the ultimate combination of traditional Tecra investment benefits, high processor performance and a new sleek look and feel.

GST EX \$4,700 + GST \$470.00
(A2860) GST INC

\$5,170.00

*SS = Speed Step



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Compare Tecra Models

	Tecra 8100	Tecra 8100	Tecra 8100	Tecra 8100
Processor	Celeron 600MHz	Pentium III 600MHzSS*	Pentium III 700MHzSS*	Pentium III 750MHzSS*
RAM Std/Max	64 MB	64 MB	128 MB	128 MB
Hard Disk	6GB	12GB	12GB	20GB
Screen	14.1" TFT	14.1" TFT	14.1" TFT	14.1" TFT
CD-ROM	24x CD-ROM	24x CD-ROM	24x CD-ROM	24x CD-ROM
Mic & Spkr	Speakers	Speakers	Speakers	Speakers
Port replicator	Optional	Optional	Optional	Optional
Select bay	Yes	Yes	Yes	Yes
DVD capable	6 x DVD	6 x DVD	6 x DVD	6 x DVD
Weight	2.8 kg	2.8 kg	2.8 kg	2.8 kg
Warranty	3 Years	3 Years	3 Years	3 Years
56K V.90 modem	Yes	Yes	Yes	Yes
RENT*	\$47.12	\$57.60	\$59.22	\$67.66
GST Ex + GST	\$4,700 + \$470.00	\$5,745 + \$574.50	\$6,205 + \$620.50	\$7,089 + \$708.90
GST INC	\$5,170.00	\$6,319.50	\$6,825.50**	\$7,797.90**
With Windows 95/98	(A2860)	(94185)	(A2868)	(A2863)
RENT*	\$48.84	\$59.23	\$60.81	\$69.24
GST Ex + GST	\$4,871 + \$487.10	\$5,908 + \$590.80	\$6,372 + \$637.20	\$7,255 + \$725.50
GST INC	\$5,358.10	\$6,498.80	\$7,009.20**	\$7,980.50**
With Windows 2000/NT4	(A2862)	(94186)	(A2869)	(A2864)

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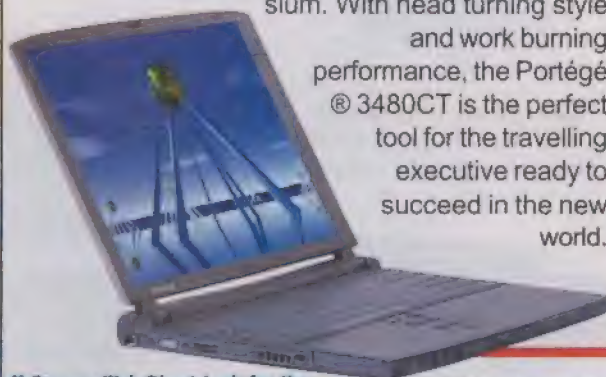
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	Portégé 3480CT	Portégé 7220CTe
Processor	PIII 600MHz	PIII 650MHz
RAM Std/Max	64/192 MB	64/192 MB
Hard Disk	12GB	12GB
Screen	11.3" TFT	13.3" TFT
Display	1024x768	1024x768
CD-ROM	Optional	Optional
Mic & Spkr	Yes	Yes
Port replicator	Optional	Optional
Select bay	No	No
LAN	Yes	Optional
DVD capable	Yes	Yes
Weight	1.6 kg	2 kg
Warranty	3 Years	3 Years
56K V.90 modem	Yes	Yes
RENT*	\$47.17	\$57.78
GST Ex + GST	\$4,705 + \$470.50	\$5,940 + \$594.00
GST INC	\$5,175.50 (A5779)	\$6,534.00 ** (A2839)
RENT*		\$60.72
GST Ex + GST		\$6,108 + \$610.80
GST INC		\$6,718.80 ** (A2847)
Windows 2000/NT4	(N/A)	

Portégé 3480CT

The Portégé® 3480CT is the ultimate statement in mobile computing with its Pentium® III power, large high resolution colour display, long battery life and easy functionality all packed into an ultra thin lightweight body finished in sleek magnesium. With head turning style



and work burning performance, the Portégé® 3480CT is the perfect tool for the travelling executive ready to succeed in the new world.

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Toshiba Install Options

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Options for Toshiba Notebooks

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TOSHIBA EDO Memory Upgrades

32MB for Tecra 8000 (not for PIII models)/
Portégé7000/Satellite 4000

GST Ex \$186 + GST \$18.60 (29356) GST INC **\$204.60**

32MB for Portégé 3110

GST Ex \$172 + GST \$17.20 (81078) GST INC **\$189.20**

64MB for Tecra 8000 (not for PIII models)/
Portege7000/Satellite4000

GST Ex \$223 + GST \$22.30 (29348) GST INC **\$245.30**

64MB for Portégé 3020

GST Ex \$362 + GST \$36.20 (77229) GST INC **\$398.20**

TOSHIBA Battery Packs

For Satellite 4000/4010/2520CDT & others

GST Ex \$108 + GST \$10.80 (21930) GST INC **\$118.80**

For Portégé 3010/3020 (Lithium Ion)

GST Ex \$124 + GST \$12.40 (73665) GST INC **\$136.40**

For Satellite 4000 Series

GST Ex \$108 + GST \$10.80 (72109) GST INC **\$118.80**

For Tecra 8000 (Lithium Ion)

GST Ex \$235 + GST \$23.50 (29358) GST INC **\$258.50**

TOSHIBA High Capacity Battery Packs

For Portégé 3010/3020

GST Ex \$235 + GST \$23.50 (72475) GST INC **\$258.50**

For Portégé 7000/7020

GST Ex \$269 + GST \$26.90 (66479) GST INC **\$295.90**

TOSHIBA Battery Charger

For Tecra 8000

GST Ex \$366 + GST \$36.60 (29357) GST INC **\$402.60**

TOSHIBA Universal AC Adapter

For Tecra 8000/Satellite 4000/4010 & others

GST Ex \$114 + GST \$11.40 (44200) GST INC **\$125.40**

TOSHIBA Additional 2 Year Warranty

For Satellites with TFT Display

GST Ex \$181 + GST \$18.10 (21729) GST INC **\$199.10**

TOSHIBA Port Replicators

For Tecra II 750/780/8000

GST Ex \$560 + GST \$56.00 (79226) GST INC **\$616.00**

TOSHIBA Desk Station V+

For Tecra 8000 Series

GST Ex \$855 + GST \$85.50 (84096) GST INC **\$940.50**

TOSHIBA Carry Bags

Toshiba Friend Carry Bag

GST Ex \$67 + GST \$6.70 (75901) GST INC **\$73.70**

Leather Bag for A4 Notebooks

GST Ex \$178 + GST \$17.80 (68408) GST INC **\$195.80**



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Choose from a range of Microsoft operating systems including Windows 2000 to match your corporate standard.



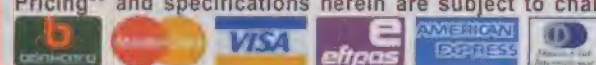
e-Diagnostics
The intelligent eDiagTools technology allows instant problem identification and web-enabled notification to HP or your support staff.

Processor:	HP e-Vectra C566	HP e-Vectra C533	HP e-Vectra P733	HP e-Vectra P733
SDRAM	64MB	128MB	128MB	128MB
Hard Disk	8.4G	8.4G	8.4G	8.4G
FDD	optional	optional	optional	optional
Monitor	no	no	no	no
CD - ROM	24x	24x	24x	24x
OS	Windows '98	Windows '98	Windows '98	Windows 2000
GST Ex	\$1,445	\$1,494	\$1,986	\$2,152
+ GST	+\$144.50	+\$149.40	+\$198.60	+\$215.20
Part No.:	(A3532)	(98420)	(A3530)	(A3529)
GST INC:	\$1,589.^{50*}	\$1,599.^{40*}	\$2,184.^{60*}	\$2,367.^{20*}
Rental:	\$17.42	\$17.53	\$23.94	\$23.21

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HP ProCurve 2224 Switch



Low-cost desktop switch ideal for delivering performance to workgroups with a mix of 10Mbps and 100Mbps devices and for migrating from 10Base-T to 100Base-TX:

- 24 10/100Base-TX autosensing ports
- One open transceiver slot
- Unmanaged
- Low, industry-leading price

Rent 3yrs - **\$11.73***

GST Ex: \$973 + GST: \$97.30

(75515) GST INC:

\$1,070.30

HP ProCurve Switch 2424M



Desktop switch ideal for low-cost migration to 10/100 stackable switching:

- 24 10/100Base-TX autosensing ports
- Open module slot for Gigabit stacking and uplinks
- Managed
- Low industry-leading price
- FREE Top Tools software incl.

Rent 3 yrs **\$22.53***

GST Ex: \$2,059 + GST: \$205.90

(75513) GST INC:

\$2,297.90

HP ProCurve 4000M Switch



A feature-rich, modular 10/100/Gigabit desktop switch that provides low-cost switching and all the benefits of HP Proactive Networking. Ideal for medium-to-large businesses looking for scalable, expandable, low-cost migration to 10/100/Gigabit switching to the desktop.

FREE Top Tools software incl.

GST Ex: \$3,421 + GST: \$342.10

(66063) GST INC: **\$3,763.10**

Optional Gigabit Module for

GST Ex: \$1,706 + GST: \$170.60

(76563) GST INC: **\$1,876.60**

HP ProCurve Switch 408

Unmanaged 8 port 10/100 switch in a compact sized package. This switch offers half/full duplex, 10/100

autosensing on every port.

Warranty: Lifetime, Exchange Next Day

GST Ex: \$444

+ GST: \$44.40

(79125) GST INC:

\$488.40

NEXT BUSINESS DAY ADVANCE REPLACEMENT - LIFETIME WARRANTY

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NETSERVER E-200

The Server with the best price/performance value for small businesses.

Starts your small business off on the right Track. The HP NetServer E200 offers the best value-to-performance ratio of any major server supplier.

A desktop PC may do the job when you are starting out, but as your small business expands, it quickly out grows the ability to cut corners on something as fundamental as a server. And with the HP NetServer E200 HP leads the top tier server suppliers offering full server grade technology, functionality and performance for the price of a PC.

- Intel PIII600 MHz processor with 133MHz front size bus
- 64MB registered ECC RAM standard (expandable to 768)
- 9.1GB, 7200rpm, 68-pin Ultra Wide SCSI HDD
- Four PCI, one ISA
- Integrated HP NetServer 10/100TX LAN adapter

Rent 3 yrs - **\$25.91***

GST Ex: \$2,402 + GST: \$240.20

(A1489) GST INC: **\$2,642.20**

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Presario 7480



7480 Series Internet PC with 15" Monitor
 AMD K6-2 550Mhz Processor with 3DNow!™ Technology
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(A5099)



GST Ex \$1635 + GST \$163.50

(A5778) **\$1,798.⁵⁰** From \$19.71/wk*

Presario 5110



5000 Series Internet PC with 15" Monitor
 Intel® Celeron® 566Mhz Processor
 128KB Integrated L2 Pipeline Burst Cache
 10.0GB Ultra DMA Hard Disk Drive
 64MB SynchDRAM (Shared Video RAM)
 40X CD-ROM Drive
 56Kbps ITU V.90 Internal Modem
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 Easy Access Internet Keyboard

GST Ex \$1814 + GST \$181.40

(A4403) **\$1,995.⁴⁰** From \$21.87/wk*

Presario 5180



5000 Series Internet PC with 17" Monitor
 Intel® Pentium® III 750Mhz Processor
 256KB Integrated L2 Pipeline Burst Cache
 20.0GB Ultra DMA Hard Disk Drive
 64MB SynchDRAM (Shared Video RAM)
 CDR-W
 56Kbps ITU V.90 Internal Modem
 Internet Scroll Mouse
 Easy Access Internet Keyboard

GST Ex \$2908 + GST \$290.80

(A4460) **\$3,198.⁸⁰** From \$31.37/wk*

Presario 7000



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Logitech
Quickcam

7000 Series Internet PC with 17" Monitor
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 nVidia TNT M64 Pro 16MB Video Memory
 8X DVD-ROM Drive
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GST Ex \$3635 + GST \$363.50

(A4371) **\$3,998.⁵⁰** From \$37.37/wk*

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(A3409)
GST Ex \$2,635
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- Intel® Celeron® 566Mhz Processor
- 128K Pipeline Burst Cache
- 5.0GB Ultra DMA Hard Disk Drive
- 64MB SynchDRAM (Shared Video RAM)
- 24X CD-ROM Drive
- 56Kbps ITU V.90 Internal Modem
- 12.1" HPA Screen
- JBL Pro Audio System
- 3.3 Kgs
- **Bonus - Free Carry Bag**
- 1 year return to base warranty

Presario 12XL212



(A3410)
GST Ex \$3,635
+ GST \$363.50
\$3,998.50
RentSmart from \$37.37/wk*

- Intel® Pentium® III 650Mhz Processor
- 256K Pipeline Burst Cache
- 5.0GB Ultra DMA Hard Disk Drive
- 64MB SynchDRAM (Shared Video RAM)
- 24X CD-ROM Drive
- 56Kbps ITU V.90 Internal Modem
- 13.3" TFT Screen
- JBL Pro Audio System
- 3.3 Kgs
- 1 year return to base warranty

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Presario 17XL261



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(A3414)
GST Ex \$4541
+ GST \$454.10
\$4,995.10
RentSmart from \$45.53/wk*

- Intel® Pentium® III 650Mhz Processor
- 256K Pipeline Burst Cache
- 12.0GB Ultra DMA Hard Disk Drive
- 64MB SynchDRAM
- ATI Mobility 1 - 8MB Video Memory
- 6X DVD-ROM Drive
- 56Kbps ITU V.90 Internal Modem
- 14.4" TFT XGA Screen
- JBL Pro Audio System
- Intel® SpeedStepT Technology
- 1 year return to base warranty

Hot Swap
Future Bay

Presario 80XL20



(A3415)
GST Ex \$4033
+ GST \$403.30
\$4,436.30
RentSmart from \$41.46/wk*

- Intel® Pentium® III 600Mhz Processor
- 256K Pipeline Burst Cache
- 6.0GB Ultra DMA Hard Disk Drive
- 64MB SynchDRAM
- ATI Mobility 1 - 4MB Video Memory
- 24X CD-ROM Drive
- 56Kbps ITU V.90 Internal Modem
- 12.1" TFT XGA Screen
- PCI Stereo Audio
- Intel® SpeedStepT Technology
- 1 year return to base warranty

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All Aspires standard with

- 15" Monitor
- Speakers
- V.90 56k internal fax
- Microtower housing



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Pentium III available in some Acer Systems

All Acer Powers Include:

- Acer 15" CRT monitor
- Speakers
- Integrated UMA 8MB VGA (AcerPower Se)
- 16MB Vanta 3D graphics accelerator (AcerPower Sn)
- 16-bit sound
- Microtower
- PC-Cillin anti-virus

Model	Aspire 6300R	Aspire 6400	Aspire 6400	Aspire 6400
CPU	Celeron 600	PentiumIII667	PentiumIII800	PentiumIII866
RAM	64MB	64MB	128MB	128MB
HDD	10GB	15GB	20GB	30GB
CD/LAN	8x4x32 CD-RW	8x4x32 CD-RW	8x4x32 CD-RW	8x4x32 CD-RW
Video	Integrated UMA 8MB	nVidia TNT-2 16MB	nVidia TNT-2 16MB	nVidia TNT-2 16MB
Op. system	Win 98	Win 98	Win 98	Win 98
Part number	(A4736)	(A3553)	(A3260)	(A2079)
RENT*	\$22.05	\$24.93	\$29.47	\$37.27
GST Ex + GST	\$1,829 + \$182.90	\$2,311 + \$231.10	\$2,732 + \$273.20	\$3,455 + \$345.50
GST INC	\$2,011.90	\$2,542.10	\$3,005.20	\$3,800.50

All Aspires come with the following fantastic software:

• MS Windows 98SE/1.E.5.0

• Microsoft Works 4.5

• World Book Multimedia Encyclopaedia

• KidDesk Internet Safe

• PC-Cillin antivirus

• PC-Doctor

• My Aspire Guide

• Aspire time Machine System recovery

• Aspire Recovery CD

• Hasbro Interactive Battleship**

• Hasbro 3 game CD: Sorry!, Yahtzee, Smart Games Challenge II**

• Acer Computer Explorer**

• Aspire webSIGHT**

• Acer Camera Software Site**

Acer Power Se

At the heart of the AcerPower Se series is the SiS620/5595 AGPset chipset, which provides a platform for the full range of Intel® Celeron processors. The microtower housing design provides total structural integrity, durability and operational peace of mind.



Model	AcerPower Se	AcerPower Sn
CPU	C566	C600
Memory*	64MB/7.5G	64MB/10G
CD/LAN	CD/LAN	CD/LAN
Op. system	Win 98	Win 98
BONUS s/w	Lotus SmartSuite	Lotus SmartSuite
Part number	(A4742)	(A3554)
RENT*	\$17.53	\$18.85
GST Ex + GST	\$1,454 + \$145.40	\$1,564 + \$156.40
GST INC	\$1,599.40	\$1,720.40

Acer Power Sn

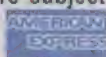
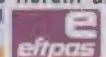
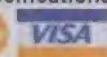
AcerPower Sn: The 16-bit audio on a PCI interface which further enhances multimedia-computing environments and adds rich sound to your multimedia projects. The AcerPower Sn has the winning combination for small businesses.

Model	AcerPower Sn	AcerPower Sn	AcerPower Sn	AcerPower Sn	AcerPower Sn
CPU	PIII650	PIII650	PIII700	PIII700	PIII750
Memory	64MB/10G	64MB/10G	64MB/10G	64MB/10G	128MB/15G
CD/LAN	CD/LAN	CD/LAN	CD/LAN	CD/LAN	CD/LAN
Op. system	Win 98	Win 98	Win 98	Win NT	Win 98
BONUS software	Lotus SmartSuite Quicken Business	Lotus SmartSuite MS Office SBE	Lotus SmartSuite		Lotus SmartSuite
Part number	(A4745)	(A4747)	(A4751)	(A4749)	(A4753)
RENT*	\$21.90	\$23.52	\$24.10	\$22.54	\$24.51
GST Ex + GST	\$1,817 + \$181.70	\$2,181 + \$218.10	\$1,999 + \$199.90	\$2,090 + \$209.00	\$2,272 + \$227.20
GST INC	\$1,998.70	\$2,399.10	\$2,198.90	\$2,299.00	\$2,499.20

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Acer TravelMate Notebook Series

The Perfect combination of connectivity, portability & design elements.

The TravelMate 520 series all-in-one business portable from Acer heralds the arrival of a new business-computing era. Acer's latest all-in-one portable offers the versatility, performance, and dependability to make it the quintessential business productivity tool. Make your mark. Make an impression.

Model	520iT	521TXV
Screen	12.1" TFT	14" TFT
CPU	C550	PIII600SpeedStep
Memory	64MB	64MB
HDD	4.8GB	6GB
Graphics	8MB	8MB
CD-ROM	24xCD	NO
DVD	NO	6xDVD
Fax/Modem	56Kbps	56Kbps
LAN Card	10/100 LAN	10/100 LAN
Op. system	Win 98 SE	Win 98 SE
Part number	(A2424)	(A2425)
RENT*	\$31.37	\$44.17
GST Ex + GST	\$2,908 + \$290.80	\$4,297 + \$429.70
GST INC	\$3,198.80	\$4,726.70

Acer 520
Series



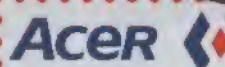
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Everyone at Acer is committed to being there for you like no one else will. That's why six out of ten of Australia's biggest IT users, use Acer PCs. And why Acer was rated No.1 in customer service and support by the Australian Personal Computer magazine survey. Our quality **TravelMate** notebooks now carry our guarantee of a 2-hour warranty service in Sydney, Melbourne, Brisbane, Canberra, Perth and Adelaide*. This means we'll fix your TravelMate notebook within two hours of you dropping it off at one of our service centres.

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*Metropolitan areas only.
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Acer 600
Series



Acer 340
Series



Acer
200DX

Model	345T (CD)	345T (DVD)	200DX	602TER
Screen	12.1" TFT	12.1" TFT	12.1" TFT	13.3" TFT
CPU	PIII600SpeedStep	PIII600SpeedStep	C550	PIII650SpeedStep
RAM	64MB	64MB	32MB	64MB
HDD	6GB	6GB	5GB	12GB
Graphics	2.5MB	2.5MB	4MB	8MB
CD-ROM	24 x CD	NO	24xCD	20x4x4 CD-RW
DVD	NO	6 x DVD	NO	NO
Fax/Modem	56Kbps	56Kbps	56Kbps	56Kbps
Other	10/100 Lan	10/100 Lan	NO	10/100 Lan
OS	Win 98	Win 98	Win 98	Win 98
Part	(94817)	(94818)	(A5824)	(A2426)
RENT*	\$42.36	\$43.91	\$26.90	\$53.69
GST EX + GST	\$4,121+ \$412.10	\$4,272+ \$427.20	\$2,494 + \$249.40	\$5,355 + \$535.50
GST Inc	\$4,533.10	\$4,699.20	\$2,743.40 RRP	\$5,890.50

Rent Smart
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Memory Stick Digital Camera

1.3 Megapixel resolution (1.6 megapixel interpolated) 6x Precision Digital zoom (3x Optical zoom) 2" Colour LCD monitor, Interface Scan Super HAD CCD InfoLITHIUM M series battery 12bit A/D conversion Super Resolution Converter Automatic Focus Automatic/Priority Aperture Automatic/Priority Shutter Auto/Manual/Preset White Balance Exposure control



GST Ex \$995 + GST
\$99.50

(99849) GST INC

\$1,094.⁵⁰

Cyber-shot DSC-S70

Memory Stick Digital Camera 3.3 Megapixel

resolution, 6x Precision Digital zoom (3x Optical zoom), 2" Colour LCD monitor, Super HAD CCD InfoLITHIUM M series battery, MPEG Movie function, Auto Focus, Auto/Priority Aperture, Auto/Priority Shutter, Sharpness control Spot Metering Automatic Photo Orientation (Portrait/Landscape) Built-in flash, red-eye reduction, External Flash socket, On-Screen Display, video/audio out, USB In/Out, Self Timer function Date/Time Stamp function Windows and Mac compatible



GST Ex \$1,536 + GST

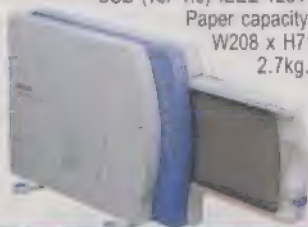
\$153.60 (99850) GST INC

\$1,689.⁶⁰

Digital Photo Printer

Digital Photo Printer

• Printing method: dye sublimation • Resolution: Approx 300dpi • Gradations: 256 for yellow, magenta, cyan. Over 16.7 million colours per dot • Paper size: 180x100mm (UPC-10P23E, UPC-10P34, UPC-10S01) • Printing time: approx 85 s/sheet • Interface: USB (ver 1.0) IEEE-1284 (compatible, nibble ECP) • Paper capacity: 25 sheets • Dimensions: W208 x H71 x D303mm • Weight: approx 2.7kg.



GST Ex \$735
+ GST \$73.50
(A5052) GST INC

\$808.⁵⁰

VPLCS1 Projector

Ultra Compact Projector

Light- 600 ANSI Lumens • 120w UHP lamp • Image- native resolution: SVGA • Intelligent compression: VGA, XGA, SXGA • Screen coverage: 40" - 150" • Inputs: various including composite video, S video, component and RGB • General: power consumption: Max 190w, standby 4.2w • 2x 0.5w stereo speakers • Dimensions W277 x H70 x D214mm • Weight: approx 2.9kg.



GST Ex \$4,900 + GST
\$490.00 (97403) GST INC

\$5,390.⁰⁰

Win the ultimate Laptop

Sony Data Media is giving you the chance to win the ultimate laptop

The amazing VAIO from Sony! VAIO WORLD is a world of possibility where digital products interact seamlessly. Bringing together audio and video, computing and communications. To win the ultimate laptop simply purchase specially marked boxes of CDR and Floppy disk or Sony DDS cartridges during August and November and you can be in the running to win one of 5 VAIO Laptops.



Sony CDR

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GST INC

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600MHz featuring Intel SpeedStep
Technology •64MB SDRAM memory
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XGA colour TFT display •Memory
Stick Direct Slot



GST Ex \$4,363 + GST \$436.30

(A2499) GST INC **\$4,799⁻³⁰**

Sony VAIO F660

•Mobile Intel Pentium III Processor
550MHz featuring Intel SpeedStep
Technology •64MB SDRAM memory
•12GB hard drive •15" XGA TFT colour
display •Built-in CD-ROM drive and
removable FDD •Triple Programmable
Power Keys



GST Ex \$3,936 + GST \$393.60

(A2497) GST INC **\$4,329⁻⁶⁰**

Sony VAIO Z505FA

•Mobile Intel Pentium III Processor
650MHz featuring Intel SpeedStep
Technology •128MB SDRAM memory
•12GB hard drive •12.1" XGA colour
TFT colour display •Memory Stick Direct
Slot •Direct Ethernet port



GST Ex \$5,090

+ GST \$509.00

(A2498) GST INC

\$5,599⁻⁰⁰

Sony VAIO XE7

•Mobile Intel Pentium III Processor
650MHz featuring Intel SpeedStep
Technology •128MB SDRAM memory
•18.1GB hard drive •14.1" XGA colour
TFT display •Removable CD-RW drive
•Mini docking station



GST Ex \$6,181 +

GST \$618.10

(A2496) GST INC

\$6,799⁻¹⁰

Assorted Memory Sticks

8MB Memory Stick

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GST \$6.00

(88647)

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GST \$9.50

(86779)

GST INC

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(88654)

GST INC

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64MB Memory Stick

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(88648)

GST INC

\$277⁻²⁰

VAIO World Products

Sony Memory Stick

Smaller than a stick of chewing gum, Memory Stick is the next generation of digital storage media. Imagine carrying around an entire encyclopedia, your complete medical records, a whole library of electronic books and generations of family albums in your pocket. Now imagine Memory Stick - a miniature recording media that fits every digital product you own, including your mobile phone, car, PC, Laptop, camera, Handycam, personal audio player, hi-fi, TV, photo frame and robot. And this is only a taste of what's to come. Memory stick allows information, images, sound and other digital data to move from one digital device to another. Sony has released the 8MB, 16MB, 32MB & 64MB with 128MB & 1GB in development. Transferring Memory Stick data is easy through Sony's easy-to-use Memory Stick Floppy Disk Adaptor, PC-Card Adaptor or a fast USB Adaptor.

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ThinkPad A20M

- Celeron 500MHz
- 64MB RAM standard
- HDD 6GB
- 24 x CD-ROM
- 12.1" TFT screen
- Windows 98



Rent 3 years - **\$34.11****

GST Ex \$3,162 + GST \$316.20 (A0693) GST INC

\$3,478.²⁰

ThinkPad T20

- Pentium III 700SSMHz
- 128MB RAM standard
- HDD 12GB
- 6 x DVD
- 14.1" TFT screen
- Windows 2000



Rent 3 years - **\$68.53****

GST Ex \$7,181 + GST \$718.10 (A0702) GST INC

\$7,899.¹⁰

Announcing: NetVista - A new era in Desktops & Thin Clients

Experience the flexible, easy-to-use, ultracompact design of the IBM NetVista legacy-free system. You can count on fast, easy connections, reduced need for support and lower costs with today's current technologies, including USB.

NetVista A40 LEGACY-FREE

Model	6578-LCA
Processor	PIII733MHz
RAM	64MB
HDD	10GB
Op System	Windows 98 SE
Rent TAP*	\$21.90**
Part No	(A5540)
GST Ex	\$1,817*
+GST	\$181.70*
GST INC	\$1,998.⁷⁰



* Monitor not included ** Inc GST per week over 3 years

Netfinity 3500 Server

Netfinity 3500

- Pentium III 733MHz
- 128MB RAM standard
- 9.1Gb HDD, Maximum storage capacity 145.6GB
- 256KB Level 2 Cache
- CD-ROM 40x max
- Network Interface: Ethernet-Integrated



Rent 3 yrs - **\$45.20****

GST Ex \$4,397 + GST \$439.70

(A3359) GST INC **\$4,836.⁷⁰**



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Compucon AMD



600MHz

AMD Duron Processor

- 10.2GB Ultra DMA 66 Hard Disk Drive
- 64MB PC133 SDRAM
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- 1 x AGP, 3 x PCI and 1 x CNR Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 Wheel Mouse
- Windows 95 or 98
- PS/2 104-key Keyboard
- Midi-Tower Case

- 1.44 Floppy Disk Drive
- 3 Years On-Site Warranty

Rent 3 Yrs** **\$15.77**
GST Ex \$1,308 + GST \$130.80
(A5234) GST Inc
\$1,438.80*

* Monitor Not included

This system with 15" Compucon Multimedia Monitor:
Rent 3 Yrs** **\$19.19xx** GST Ex \$1,592 + GST
\$159.20 GST Inc \$1,751.20
Monitor price is
GST Ex \$284 + GST \$28.40
(25874) GST Inc **\$312.40**

Intel Celeron



566MHz

Intel Celeron Processor

- PS/2 Wheel Mouse
- Windows 95 or 98
- 10.2GB Hard Disk Drive
- 64MB 133Mhz RAM
- 4MB AGP Graphics Card (ATI RANRge)
- 1x AGP, 1x AMR, 5x PCI and 1x ISA Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 104-key Keyboard
- 10MB Combo Network Card

- Midi-Tower Case
- 1.44 Floppy Disk Drive
- 3 Years On-Site Warranty

Rent 3 Yrs** **\$15.84**
GST Ex \$1,314 + GST \$131.40
(A5185) GST Inc
\$1,445.40*

* Monitor Not included

This system with 15" Compucon Multimedia Monitor:
Rent 3 Yrs** **\$19.26** GST Ex \$1,598 + GST
\$159.80 GST Inc \$1,757.80
Monitor price is
GST Ex \$284 + GST \$28.40
(25874) GST Inc **\$312.40**

Intel Pentium III



667MHz

Intel Pentium III Processor

- 10.2GB Hard Disk Drive
- 64MB 133Mhz RAM
- 4MB AGP Graphics Card (ATI Range)
- 1x AGP, 1x AMR, 5x PCI and 1x ISA Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 Wheel Mouse
- Windows 95
- PS/2 104-key Keyboard
- 10MB Combo Network Card

- Midi-Tower Case
- 1.44 Floppy Disk Drive
- 3 Years On-Site Warranty

Rent 3 Yrs** **\$18.19**
GST Ex \$1,509 + GST \$150.90
(A5185 + A5192) GST Inc
\$1,659.90*

* Monitor Not included

This system with 17" Compucon Multimedia Monitor:
Rent 3 Yrs** **\$22.80** GST Ex \$1,891 + GST
\$189.10 GST Inc \$2,080.10
Monitor price is
GST Ex \$382 + GST \$38.20
(25906) GST Inc **\$420.20**



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The Quantum Snap Server is the ideal solution for upgrading your network storage. It offers the perfect combination of quick and easy installation at prices far below what you would pay for a traditional NT server. It's pre-configured to work in all major network environments, which means you really just plug it in and turn it on - with no network downtime. In fact, the Snap Server is so hassle-free, it installs in less than 5 minutes!

Snap!
server



Performance

- Pentium-class processor with
- Quantum Ultra ATA hard disk drives
- RAID 0, 1 or 5
- Unlimited license, easily supports 100 clients

Compatibility Simultaneous support for Windows 95/98 2000, NT, NetWare, UNIX and Macintosh networks and clients across TCP/IP, IPX, NetBEUI and AppleTalk

Network Security Integrates with NT Domain Controller and NetWare Bindery servers or local user list

Warranty 3-year parts and labour

The Award-Winning Snap Server Family

15GB 1 drive, desktop, portable

GST Ex: \$999 + GST: \$99.90 (A3489) **GST Inc: \$1,098.90**

30GB 1 drive, desktop, portable

GST Ex: \$1,433 + GST: \$143.30 (A3528) **GST Inc: \$1,576.30**

60GB 2 drives, RAID 0, 1, desktop

GST Ex: \$3,071 + GST: \$307.10 (A3526) **GST Inc: \$3,378.10**

120GB 4 drives, RAID 0, 1, 5, rack-mount

GST Ex: \$5,637 + GST: \$563.70 (A3527) **GST Inc: \$6,200.70**



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Here's how it works:

- 1 Simply shop for the equipment you need on the Harris site now.
- 2 Select RentSmart as your chosen payment method.
- 3 Complete the quick, secure online application form.
- 4 If you are approved with RentSmart, your RentSmart account will be automatically set up in just minutes.

RentSmart will then send you your application to sign, and your equipment will be ordered.

Remember, renting is the cost-effective solution for businesses to get the technology they need to succeed.



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Purchase Price (GST Inclusive)	36 Months (per week)	24 Months (per week)
\$1000	\$10.96	\$13.73
\$2000	\$21.92	\$27.46
\$3000	\$29.42	\$39.12
\$5000	\$45.58	\$62.08

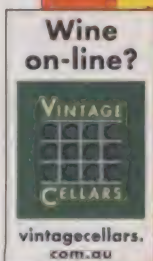
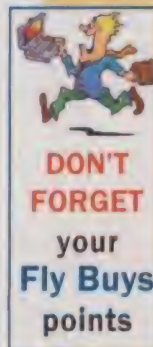
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Prices intended as a guide only. RentSmart is available to qualifying customers on selected products with a total retail value above \$500.

*Consult your accountant for further advice.



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Smart-UPS 700, 1000, and 1400 2U Rack Mounts

Utilizing Surface Mount Technology, more Application-Specific Integrated Circuits, and fewer components, we have created a more reliable UPS. New 2U(3.5in/8.89cm) design saves valuable rack U space. These models require 30% less rack height and will still fit into a 600mm four-post rack!



APC Smart-UPS 2u700

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(99595) GST INC

\$794.20

APC Smart-UPS 2u1000

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(99596) GST INC

\$1,090.10

APC Smart-UPS 2u1400

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(99597) GST INC

\$1,599.40

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- PowerChute[®] Plus software lets your UPS shut down your applications gracefully in the event of an extended power failure
- Audible alarms
- Additional outlet for protection of printers
- Phone/modem protection
- User replaceable, hot swappable batteries



APC Back-UPS Pro 280si

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(76636) GST INC

\$266.20

APC Back-UPS Pro 420si

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(76637) GST INC

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APC Back-UPS Pro 650si

GST Ex \$405 + GST \$40.50

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APC Surge Arrest

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SurgeArrest is equipped with a fast acting fuse that reacts quickly to lightning strikes and other catastrophic surge events. In addition, a thermal fuse shuts your system down in the event of a dangerous wiring fault. In both cases, SurgeArrest actually blocks errant power from reaching your equipment if the surge components are damaged



SurgeArrest 5 Strip

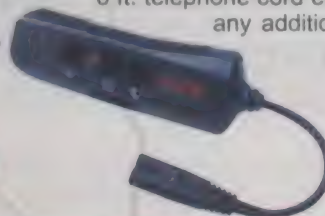
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(99591) GST INC

\$53.90

The SurgeArrest Notebook Pro Surge Protector provides the mobile notebook professional with advanced AC and telephone line protection. The unique, in-line design creates a compact, lightweight surge protector that is truly portable and appropriate for use in any country throughout the world. With built-in Excess Current Detection, the Notebook Pro warns you against potential modem damage. A Velcro mounting strap and 6 ft. telephone cord eliminate the need to carry any additional accessories.



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BIG in functionality.



Powerful - Access up to 6000 Entries
Portable - Credit Card Sized, and weighs only 1.4 ounces, so you can take your important data with you.

Easy to Use - Includes everything you need to get organized, synchronise with software on your computer.

- Display: 9-line, high-contrast 160 x 98 black-and-white LCD
- Memory 512K
- Size: 3-3/8" x 2-1/8" x 1/4"
- PCMCIA: Type II PC Card

GST Ex: \$163 + GST: \$16.30

(86631) GST Inc: **\$179.³⁰**

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● Port Converters & USB Hubs

PortGear solutions offer a complete line of USB hubs and port converters for attaching a variety of peripherals to your PC, including printers, scanners, digital cameras, joysticks, zip drives and more. The PortGear line of products are designed for stackability so you can add as many devices as you need now and in the future. With Xircom PortGear products, you can enjoy easy and cost-effective port expansion for your PC.

USB HUBS

4 port USB for PC's

GST Ex: \$119 + GST: \$11.90 (A5302) GST Inc: **\$130.⁹⁰**

4 port Multifunction

GST Ex: \$218 + GST: \$21.80 (A5304) GST Inc: **\$239.⁸⁰**

7 port USB for PC's

GST Ex: \$153 + GST: \$15.30 (A5303) GST Inc: **\$168.³⁰**

PORT CONVERTERS

USB to 9 Pin Serial

GST Ex: \$117 + GST: \$11.70 (A5546) GST Inc: **\$128.⁷⁰**

USB to Parallel Printer

GST Ex: \$105 + GST: \$10.50 (A5547) GST Inc: **\$115.⁵⁰**

USB to SCSI

GST Ex: \$150 + GST: \$10.50 (A5544) GST Inc: **\$165.⁰⁰**

4 port USB
for PC's

7 port
Multifunction

7 port
USB for
PC's

USB to 9
Pin Serial

USB to Parallel
Printer

USB to
SCSI

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Total Access Security for Networks & E-Commerce MULTIPLE BIOMETRIC SOLUTIONS

PASSWORDS are the weakest security link in your network. You forget them. Hackers decode them. They're easily lost, transferred or stolen. It leaves your data very vulnerable.

With Triton Secure Positive Identification Solutions you use your iris, finger, face or voice to secure access to your data, whether it be to your LAN, WAN, Internet, Intranet Extranet or even Physical Access. Biometrics, it's positive identification that's with you all the time.

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SAFtyLatch



Folder Protection for Individual PC's Using Voice Technology

GST Ex: \$121 + GST: \$12.10
(A5456)
GST Inc: **\$133.10**

SAF2000



Multiple Biometrics Suite For Enterprise Networks

GST Ex: \$313 + GST: \$31.30
(A5458)
GST Inc: **\$344.30**

Veridicom

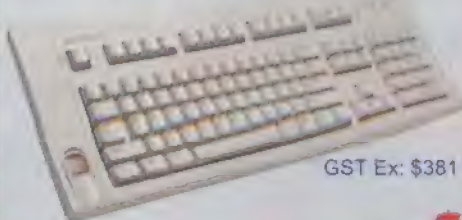
Capacitance Finger Image Scanner



GST Ex: \$354
+ GST: \$35.40
(A5524)
GST Inc: **\$389.40**

Phoenix

Programmable keyboards for Security, Banking and Point of Sale



GST Ex: \$381 + GST: \$38.10
(A5453)
GST Inc: **\$419.10**

SAFsite Server with 10 Users

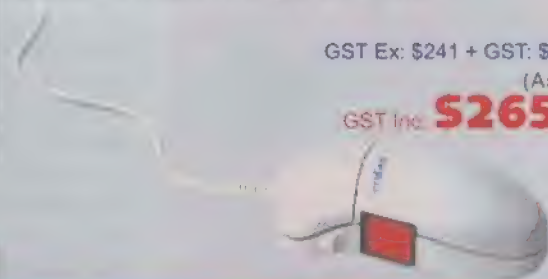
Development Tools for All On-Line Security Solutions



GST Ex: \$313 + GST: \$31.30
(A5511)
GST Inc: **\$344.30**

SecuGen

Optical Finger Image Scanner



GST Ex: \$241 + GST: \$24.10
(A5520)
GST Inc: **\$265.10**

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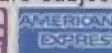
Not all products are in-store, but consulting & advice available on all items

DCT

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Small-Medium Business Networks

DES-3624IF

24 Port Stackable Giga Switch



The DES-3624IF unit offers 24 ports of 10/100TX. Plus 1 100 base FX (SC) port build in SNMP and RMON agents. Optional giga module available.

**NEW
PRODUCT**

GST Ex: \$1,816 + GST: \$181.60
(90759) GST Inc: **\$1,997.⁶⁰**

DES-1016R

16 Port Switch for Workgroups



Built with advanced functions, these switches are designed for the

workgroups with advanced requirements. Powerful yet easy to use, they allow users to simply plug any port to either a 10Mbps or 100Mbps node to multiply bandwidth, boost response time and satisfy heavy load demand.

Rack mountable.

GST Ex: \$999 + GST: \$99.90
(69456) GST Inc: **\$1,098.⁹⁰**



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DES-1024R

24 Port Switch for Workgroups



24 port Auto negotiating 10/100Mbit Switch (NWay). Supports UTP/STP cables. MDI-II Uplink ports Support Full/Half duplex. Provides cut-through and fast store & forward switching. Rack mountable.

GST Ex: \$1355 + GST: \$135.50
(76740) GST Inc: **\$1,490.⁵⁰**

DES-1008D

8 Port Fast Ethernet Switch



The D-Link DES-1008D is a powerful desktop Dual Speed 8-port 10/100Mb Ethernet/Fast Ethernet NWay auto-negotiating Switch.

GST Ex: \$282 + GST: \$28.20
(98254) GST Inc: **\$310.²⁰**

DI-701

Cable ADSL Gateway

The D-Link DI-701 Residential Gateway protects your computers from hackers or unwanted users. It is the easiest and safest way to share your high-speed Internet connection with a DSL Modem or Cable Modem.



**NEW
PRODUCT**

GST Ex: \$363 + GST: \$36.30
(98249) GST Inc: **\$399.³⁰**

DFE-550TX

PCI-Bus 10/100 Fast Ethernet Network Interface Card with Wake-On-Lan & DMI.

Intelligent Ethernet/Fast Ethernet Adapter, Auto negotiating 10. Base-T/100 Base-TX (Nway) Plug and Play Support. Low CPU utilisation. 32 high performance bus master.



GST Ex: \$59 + GST: \$5.90
(85099) GST Inc: **\$64.⁹⁰**

For all your small to medium business and home network needs

please call for more information and pricing. We have an extensive range of fantastic D-Link products on our database.

Other products available from D-Link

Description	Part #	Gst Ex	+ GST	GST Inc
D-Link DP-300 10/100 Print Server (1xSer,2xPar)	53598	\$267	\$26.70	\$293.70
D-Link DU-560M External V.90 56K Voice/Fax/Data Modem (USB)	98306	\$108	\$10.80	\$118.80
D-Link DFM-560I Internal PCI V.90 56K Voice/Fax/Data Modem	74361	\$66	\$6.60	\$72.60
D-Link DES-3225G 22+2 port 10/100Mbs Mang Switch W/ V-Lan	90755	\$1,827	\$182.70	\$2,009.70
D-Link DFE908DX 8 Port 10/100Mbs Dual Speed Hub	60558	\$261	\$26.10	\$287.10
D-Link DFE-916DX 16 Port 10/100Mbs Dual speed hub	87207	\$508	\$50.80	\$558.80
D-Link DFE2624x24-port 10/100Mbps Stackable Dual Speed Hub	98307	\$1064	\$106.40	\$1,170.40
D-Link DP-602 2 Port Internet Network Server	81535	\$338	\$33.80	\$371.80
D-Link DFE-530TX PCI-Bus 10/100Base TX Fast Ethernet Adapter	62956	\$34	\$3.40	\$37.40

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Take the Work out of Networking

10/100MBPS FAST ETHERNET SWITCHES



The NETGEAR FS105 and FS108 feature 5 or 8 switched 10/100 Mbps ports, auto-speed and duplex mode sensing. Versatile and compatible. Compact and easy to install. Vista jacks with built-in LEDs.

FS 105
5 Port Autosensing

GST Ex: \$173 + GST: \$17.30
(84722) GST Inc: **\$190.30**

FS 116
16 Port Autosensing

GST Ex: \$508 + GST: \$50.80
(A5347) GST Inc: **\$558.80**



FS 108

8 Port Slimline

GST Ex: \$252 + GST: \$25.20
(70905) GST Inc: **\$277.20**

FS 308

8 Port Autosensing

GST Ex: \$436 + GST: \$43.60
(77242) GST Inc: **\$479.60**

The NETGEAR FS516 & FS524 switches provide powerful, network center performance with all 16 or 24 ports capable of 10 or 100 Mbps, half- or full-duplex operation, automatic speed sensing. Ideal for segmenting networks into small, connected subnets. Vista network ports with built-in LEDs.

FS 516

16 Port Autosensing

GST Ex: \$867 + GST: \$86.70
(60522) GST Inc: **\$953.70**

FS 524

24 Port Autosensing

GST Ex: \$1008 + GST: \$100.80
(77549) GST Inc: **\$1,108.80**

TAKE THE WORK OUT OF NETWORKING NETWORK STARTER KITS



Free
modem sharing
software

The NETGEAR Network Starter kits give Windows users everything they need to start networking right away at either 10 Mbps or 100 Mbps. The kits containing 10/100 PCI cards, a hub or switch, network cables, modem sharing software and an easy to read how to guide. Within a few minutes, you will be able to share files and printers, exchange e-mails, play interactive games and share access to the Internet.

SB 105

5 Port 10 Mbs starter kit

GST Ex: \$119 + GST: \$11.90
(A3293) GST Inc: **\$130.90**

FB 108

8 Port switch starter kit

GST Ex: \$315 + GST: \$31.50
(73997) GST Inc: **\$346.50**

Netgear offers FREE 24-hour phone support

10/100 DUAL SPEED HUBS



These Netgear hubs connect multiple PCs to share printers, files, Internet access and e-mail communications. Mix & match 10 and 100Mbps PCs, servers and peripherals on the same network with ease and without the high cost and complexity of multiple hubs and bridges. All feature easy, plug and play installation, auto-sensing dual speed ports and vista network ports with built-in LEDs.

DS 104

4 Port Slim Line

GST Ex: \$145 + GST: \$14.50
(70795) GST Inc: **\$159.50**

DS 309

9 Port

GST Ex: \$337 + GST: \$33.70
(84749) GST Inc: **\$370.70**

DS 106

6 Port Slim Line

GST Ex: \$198 + GST: \$19.80
(84721) GST Inc: **\$217.80**

DS 508

8 Port Stackable

GST Ex: \$423 + GST: \$42.30
(18738) GST Inc: **\$465.30**

DS 108

8 Port Slim Line

GST Ex: \$205 + GST: \$20.50
(18755) GST Inc: **\$225.50**

DS 516

16 Port Stackable

GST Ex: \$597 + GST: \$59.70
(18747) GST Inc: **\$656.70**

DS 116

16 Port Slim Line

GST Ex: \$344 + GST: \$34.40
(81519) GST Inc: **\$378.40**

DS 524

24 Port Stackable

GST Ex: \$699 + GST: \$69.90
(69474) GST Inc: **\$768.90**



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Cost-effective Connectivity Solutions

GIGABIT SWITCHES

NOW SHIPPING!

These 3 new gigabit switches from Netgear make it possible for small businesses and branch offices to fulfill requirements for higher bandwidth as their networks become increasingly congested. The switches provide customers a faster server connection and allow multiple Fast Ethernet users to access the server at 100 Mbps at the same time.

FS 510T GST Ex: \$1607 + GST: \$160.70
(A1209) **GST Inc: \$1,767.70**

Eight switched 10/100Mbps ports + two 1000Mbps port
(Category 5)

FS 518T GST Ex: \$2606 + GST: \$260.60
(A1374) **GST Inc: \$2,866.60**

Sixteen switched 10/100Mbps ports + two 1000Mbps ports
(Category 5)

GS 504T GST Ex: \$2,964 + GST: \$296.40
(A1375) **GST Inc: \$3,260.40**

Four full-duplex Gigabit Category 4 ports

Please Note that Fibre Gigabit Switches are also available

GIGABIT NETWORK CARD

Gigabit Network Interface Card

GA 620T

GST Ex: \$631 + GST: \$63.10
(A1382) **GST Inc: \$694.10**



ROUTERS

ISDN ROUTER

Latest technology with ease-of-use designs.

Compatible with all major Internet ISDN equipment, this is the ideal router for Internet access, LAN-to-LAN connection, and remote access for a single user, small business or branch office over ISDN. Includes auto sensing input 10/100 network port & caller ID on phone ports.

RT 338 GST Ex: \$568 + GST: \$56.80
(97718) **GST Inc: \$624.80**

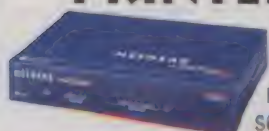
ANALOG MODEM ROUTER

Connect multiple PCs to the Internet

Router + integrated 56K modem + integrated 4-port 10BaseT hub • DHCP server • Dynamic NAT+ • Dial-on-Demand-routing • Hi/ln (STAC LZS) compression • 5 year warranty •

RM 356 GST Ex: \$494 + GST: \$49.40
(70197) **GST Inc: \$543.40**

PRINTER SERVERS



The NETGEAR print servers let you share any parallel printer among all users on the network without having to dedicate a PC for print serving and without complex setup

and configuration. These print servers connect directly to the network and can be placed anywhere convenient to the users. With a built-in network 4 port hub, the PS105 is an all-in-one connectivity solution for the SOHO users- providing file, print and resource sharing as well as network gaming.

PS 105 GST Ex: \$188 + GST: \$18.80
(67225) **GST Inc: \$206.80**

10MbpsPrint Server

The PS110 attaches to a 10 or 100Mbps hub or switch, providing effortless transition from Ethernet to Fast Ethernet. It also supports 2 parallel printers.

PS 110 GST Ex: \$211 + GST: \$21.10
(67226) **GST Inc: \$232.10**

10/100Mbps Print Server

PS 113 GST Ex: \$341 + GST: \$34.10
(A3287) **GST Inc: \$375.10**

10/100Mbps print server supports up to 3 parallel printers

CABLE/DSL INTERNET GATEWAY

Connect multiple PCs to share single IP address. The NETGEAR RT311 provides NAT service that allows up to 32 users on your 10/100 network to share the high-speed Internet connection. At the same time it also provides firewall protection to guard your network against hackers and unauthorised access from the Internet.

RT 311 GST Ex: \$339 + GST: \$33.90
(97719) **GST Inc: \$372.90**

ISDN ROUTER

Home office Internet access in a box. Includes built-in ISDN TA, 128 MultiLink PPP, DHCP Server, Dynamic NAT+, Dial-on-Demand Routing. Provides Internet access, LAN-to-LAN intranet connection, and remote access for a single user, a small business, or a branch office over ISDN.

RT 328 GST Ex: \$525 + GST: \$52.50
(68900) **GST Inc: \$577.50**

10MBPS ETHERNET HUBS



Vista jacks with built-in LED indicators • Uplink port for network expansion • Slim, sturdy metal case design • BNC/AUI backbone support option • Limited lifetime warranty • Easy plug and play installation

EN 104TP GST Ex: \$60 + GST: \$6.00
(53456) **GST Inc: \$66.00**

4 Port Slim Line

EN 108TP GST Ex: \$89 + GST: \$8.90
(53458) **GST Inc: \$97.90**

8 Port Slim Line

EN 116 GST Ex: \$196 + GST: \$19.60
(53459) **GST Inc: \$215.60**

16 Port Slim Line

EN 516 GST Ex: \$211 + GST: \$21.10
(17425) **GST Inc: \$232.10**

16 Port Rackmount

EN 524 GST Ex: \$271 + GST: \$27.10
(17435) **GST Inc: \$298.10**

24 Port Rackmount

• 16 or 24 10BASE-T ports • Easy installation • Vista network port with built-in LEDs • BNC/AUI backbone support • Internal power supply

NETGEAR

FA 310

Ethernet Adapter 10/100 PCI



(53460)
GST Ex: \$44
GST: \$4.40
GST Inc: **\$48.40**

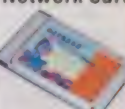
FA 312

Wake on Lan card (A1373)

GST Ex: \$53
GST: \$5.30
GST Inc: **\$58.30**

FA 410

PCMCIA 10/100 Mbps Network Card



(60071)
GST Ex: \$143
GST: \$14.30
GST Inc: **\$157.30**

FA 510

Network Card for Notebook PC

(81319)
GST Ex: \$148
GST: \$14.80
GST Inc: **\$162.80**

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Connectivity where & when you need it

3Com® OfficeConnect™ Dual 56K Modem



OfficeConnect Dual 56K LAN Modem brings low-cost, high-speed Internet and Ethernet connectivity to your Small Office/Home Office computers in just minutes! This product is designed for non-technical users that need radical simplicity, high speed Internet access as well as local file and print sharing capability.

GST Ex \$708 + GST \$70.80
(A3358) GST Inc **\$778.80**

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3Com® Megahertz® 10/100 LAN+56K Global Modem CardBus PC Card

The 3Com® Megahertz® 10/100 LAN+56K* Global Modem CardBus PC Card delivers high-speed LAN and modem connections the world over. A 32-bit CardBus architecture ensures true 100 Mbps LAN performance and the V.90 56K standard delivers high-speed modem downloads. Plus, its durable autosensing XJACK® connector eliminates the need to carry any cables.



3Com Megahertz 10/100 LAN + 56K Global
Modem with XJack GST Ex \$396 + GST \$39.60
(99215) GST Inc **\$435.60**

3Com® Megahertz® 10/100 LAN CardBus PC Card with XJACK®

Get desktop manageability in a PC Card with the 3Com® Megahertz® 10/100 LAN. CardBus PC Card. XJACK® connector delivers durable connections without carrying or losing cables. And this PC Card provides true 100 Mbps Fast Ethernet performance in 32-bit CardBus notebooks. It features low power consumption, guaranteed compatibility, and Dynamic Access* technology.



3Com Megahertz 10/100 Cardbus
PC Card XJACK GST Ex \$244 + GST \$24.40
(A3766) GST Inc **\$268.40**

* Capable of receiving downloads at up to 56 Kbps and sending at up to 31.2 Kbps. Due to IC/FCC regulations on power output, receiving speeds are limited to 53 Kbps. Actual speeds may vary. Requires compatible analog phone line and server equipment. See www.3com.com/56k/ for details.

3Com® AirConnect™ 11 Mbps Wireless LAN Solution



AirConnect 11Mbps Wireless LAN PC Cards and Access Points deliver simple, reliable and manageable wireless connections at Ethernet speeds. Dynamic rate shifting and load balancing optimize connectivity, while access control features provide security. AirConnect simplifies network setup with its PowerBASE-T feature and Site Survey Utility. Once installed, the SNMP management facility and Web-based tools ensure easy network management and configuration.

3Com AirConnect™ Wireless Access Point
GST Ex \$1,764 + GST \$176.40
(A1869) GST Inc **\$1,940.40**

3Com AirConnect Wireless LAN Starter Pack
GST Ex \$2,626 + GST \$262.60
(A1867) GST Inc **\$2,888.60**

3Com AirConnect™ 11Mbps Wireless LAN PC
Card GST Ex \$322 + GST \$32.20
(A1868) GST Inc **\$354.20**

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Australia's Leading Data Communications Products

Banksia MyModem 56K

Dual Mode Data, Fax, Voice Modem. Fully supports the ITU-T V.90 standard with full backward compatibility to Rockwell's K56flex proprietary protocol. Inbuilt automatic digital line protection. Fax transmissions are processed by the modem, not the PC, freeing PC resources. Compatible with mainframes and legacy systems with synchronous data cable.



GST ex \$199 + GST \$19.90

(73872)

\$218.90

Banksia Wave 56K

The revolutionary design of the Banksia Wave takes up less desk space than almost any other product on the market. Allows you to use your PC just like a hands-free telephone with up to 9 password protected mailboxes.

Dual V.90 and K56flex compatibility. Simultaneous Voice & Data. Built in Speakerphone and VoiceMail. Digital line protection. Includes desktop faxing and voice software.



IDEAL

FOR THE
HOME

GST ex \$181 +
GST \$18.10

(67209)

\$199.10

NetComm SmartModem56

The most feature rich modem on the market. This modem can do virtually anything you could want a modem to do. Includes DES encryption, 2 and 4 wire leased line and 8:1 compression. Dual V.90 and K56flex compatibility, asynchronous and synchronous dial back security. Includes desktop faxing and voice software. For users calling in to the SmartModem56, Call-Back, Password and CallerID protection offers advanced security to check the authenticity of the caller before access is granted to your system



GST ex \$453 + GST \$45.30

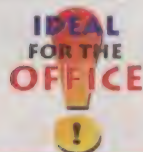
(55243)

\$498.30

Banksia NetRamp A3



The ideal solution for the small office or home office wishing to give access to all staff without having to wait for a line to become available. Includes built-in router, a 10MBT ethernet hub and serial connectors for up to 3 external modems. Allows you to browse webpages up to three times faster. By attaching 3 modems you can experience ISDN-like performance



GST ex \$635 + GST \$63.50

(87137)

\$698.50

NetComm Tru Connect



A convenient combo card which integrates Ethernet connectivity and 56K Modem with built-in connectors. Uses a single PC Card slot for both you LAN and Modem connection making it the easiest, most cost effective solution for mobile users. 10/100 capabilities, 56K and V.90, includes fax & voice s/ware.

GST ex \$396 + GST \$39.60

(99747)

\$435.60

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& Epping (VIC)

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Modems and Multimedia

Full Product Info:
www.dynalink.com.au

Dynalink Internal 56K V.90 Modems

ISA: All the features of the External. Full Hardware w/ jumpers. 5-Year Warranty. GST Ex \$108 + GST \$10.80 (77577) GST INC **\$118.80**
PCI: PnP. Send & Receive Faxes, Phone Answer Machine. GST Ex \$67 + GST \$6.70 (72909) GST INC **\$73.70**

PC-Card

• PCMCIA V.90 56k Modem
• Send & Receive Faxes
• 5-Year Warranty
GST Ex \$123 + GST \$12.30 (A2831) GST INC **\$135.30**

Dynalink 56K Voice/Fax/Data Speakerphone Modem "Good value for money... ease of setup and use is excellent... consistently connects at high speeds." PC World Nov 99. • V.90 / K56flex dual-mode for high Internet compatibility • Plug & play, plus friendly QuickGuide for easy installation • Send and receive faxes from your PC • Supports FaxStream DUET, Caller ID, Speakerphone Mode & VoiceMail.



5 Year Warranty

GST Ex \$117 + GST \$11.70 (54361) GST INC **\$128.70**

Dynalink USB Pocket Modem

• Super-easy Installation.
• Free-up Slots and IRQs.
• No power supply, no messy cables.
• Dual-mode V.90, fax machine, answer machine.
• Pocket sized for convenience and style!



5-Year Warranty

GST Ex \$126 + GST \$12.60 (A2298) GST INC **\$138.60**

Purchase any Dynalink modem & enjoy

6 MONTHS FREE INTERNET

*Six months of free Internet hours with TPG is available in: Sydney, Penrith, Gosford, Katoomba, Wollongong, Lake Macquarie, Newcastle, Melbourne, Brisbane, Southport, Gold Coast, Canberra, Adelaide, Perth
**one-off \$43.95 admin fee. 300MB Download limit per month. Unlimited 3 hour connections. Offer available for a limited time.

NEW!

Dynalink USB WebCam

- Turn your PC into a home video workstation.
- Affordable & simple video conferencing.
- Capture video and digital snapshots.
- E-mail video clips with sound
- Home security capabilities.
- Video software VP-EYE suite included.
- USB simplicity.

GST Ex \$89 + GST \$8.90

(A2832) GST INC **\$97.90**



MagicXpress TView Video Capture Card

"One of the two best cards in terms of picture quality" APC, July 9. Watch TV on your PC & capture incoming video (e.g. from CamCorder). Fully featured, including Teletext & remote control. Resizable window, right up to full-screen (640x480).



Standard:
GST Ex \$113 + GST \$11.30 (72860) GST INC **\$124.30**
With FM Tuner:
GST Ex \$132 + GST \$13.20 (78482) GST INC **\$145.20**

Verbatim Storage for life

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Full Product Info:
www.verbatim.com.au

Verbatim Signature III Colour CD Printer



The Signature III Colour CD Printer is a new, third generation ink-jet CD Colour printer from industry leader Primera Technology. It combines the fastest print speed ever offered with the highest print resolution available in the world today: 1200x1200dpi for a stunning 1.44 million pixels per square inch.

GST Ex: \$2,454 + GST: \$245.40

(89186) GST INC **\$2,699.40**

Also available, the Champion Comet is the first economical, desktop printer loader designed for the Signature II and III printers. The loader stacks up to 50 printable discs, then after printing, the discs are deposited into the output tray.

Comet Autoloader for Signature Printers

GST Ex: \$2,411 + GST: \$241.10 (97769) GST INC **\$2,652.10**

Verbatim Slim-line PC Card CD-ROM Drive



Add a CD-ROM to your Laptop!

This 24xCD-ROM can connect to any PC Card enabled PC or Notebook and is ideal for mobile computing for notebook users with no CD-Rom drive built-in. The drive is plug-and-play making installation a breeze and the slim-line tray reduces the size of traditional external PCMCIA CD-ROM drives through its lightweight and low profile design. The control panel on the top of the case allows for easy playback of audio CD's.

GST Ex: \$287 + GST: \$28.70 (97766) GST INC **\$315.70**

Verbatim CopySmart 4x4x32 CD Duplicator



Stand-alone or PC connected one-to-one duplicator able to record to both CD-R and CD-RW media. 4x CD-R, 4x CD-RW copy functions. Simple 4 button interface allowing Speed selection, Test, Copy, Compare and Quick Erase. PC based Data and Audio copying Software included.

4x Write, 4x ReWrite, 32x Read

GST Ex: \$1,270 + GST: \$127.00 (92173)

GST INC **\$1,397.00**

LOW

Verbatim PCI Firewire Card- 4 ports



Update your PC with firewire! With the included Ulead Video Software and cable you can download directly from digital video camera to your hard drive. 6 port card and repeater cards also available.

GST Ex: \$160 + GST: \$16.00 (90689) GST INC **\$176.00**

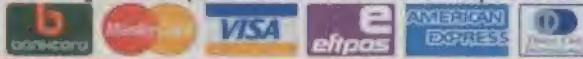
Shop at **HARRIS TECHNOLOGY** and collect **Fly Buys** Points!

HARRIS TECHNOLOGY for all your computer needs!

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Finance methods subject to approval

Verbatim



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Delivery

Web
Direct

Check for latest prices & products!

www.ht.com.au/cat/verbatim

CD-R/CD-RW: Storage for life

Verbatim CD's represent the latest in technology. Featuring a proprietary blue Metal-Azo dye which has the best resistance to sunlight, silver reflective layer for optimum read and write performance and multispeed recording.

Verbatim CD Recordable and Rewritable Discs

CD Recordable- 10 Pack

74 Min. 650 MB 1x - 12x 10 pack



GST Ex: \$18.00
+ GST: \$1.80
(76731) GST Inc:
\$19.80

CD Recordable- 10 pack in sleeves

74 Min. 650 MB Multispeed Envelope 10 pack



GST Ex: \$17
+ GST: \$1.70
(A3160) GST Inc:
\$18.70

CD Recordable- Singles

74 Min. 650MB Multispeed Singles



GST Ex: \$2
+ GST: \$0.20
(74740) GST Inc:
\$2.20

CD Recordable- 80 Minute

80 Min. 700 MB Multispeed



GST Ex: \$2
+ GST: \$0.20
(87392) GST Inc:
\$2.20

CD Recordable- Printable Surface

74 Min. 650 MB Printable Surface 50 spindle pack



GST Ex: \$90
+ GST: \$9.00
(93471) GST Inc:
\$99.00

*Printable surface
also available in
jewel-case

Audio CD Recordable

74min Audio CD Recordable



GST Ex: \$3
+ GST: \$0.30
(A2336) GST Inc:
\$3.30

CD Rewritable

533MB CD Rewritable Preformatted for Direct CD



GST Ex: \$6
+ GST: \$0.60
(A3171) GST Inc:
\$6.60

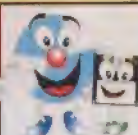
NEW!

CD Rewritable

650 MB CD Rewritable 2x 4x



GST Ex: \$5
+ GST: \$0.50
(77492) GST Inc:
\$5.50



CD Travel Case

Lightweight.
Scuff proof
exterior.
Fabric lined disc
holders
prevent scratching
and sticking
of CD's.



For 24 CDs:
(79583)
GST Ex: \$17
+ GST: \$1.70
GST Inc:

\$18.70



For 48 CDs:
(79584)
GST Ex: \$24
+ GST: \$2.40
GST Inc:

\$26.40

Headset with Microphone



Vertical in-ear
stereo headphone
with adjustable
microphone
boom. Ideal for
notebook users.

Designed for
multimedia
convenience.
Lightweight and
compact,
adjustable
headband. (Must
be powered by
a soundcard)

(77819)

GST Ex: \$17
+ GST: \$1.70
GST Inc:

\$18.70

Sales: 1300 13 9999
Fax: 1300 13 6666

Website: www.ht.com.au
E-mail: sales@ht.com.au

Do you want
FlyBuys with that?

OCT
29

RICOH

Web
Direct

www.ht.com.au/cal/ricoh

Ricoh Media

CD-R Blank
Media 74
Minutes
650Mb
(54770)

GST Ex \$3 +
GST \$0.30
GST Inc
\$3.30

CD-R Blank
Media 74
Minutes
650Mb
(Silver)
(81167)

GST Ex \$3 +
GST \$0.30
GST Inc
\$3.30

CD-R Blank
Media 74
Minutes
650Mb - 5
Pack (Silver)
(81165)

GST Ex \$13
GST \$1.30
GST Inc
\$14.30

CD-RW
DirectCD
Rewritable
media 74
Minute
650Mb
(74418)

GST Ex \$9
GST \$0.90
GST Inc
\$9.90



NEW!

MP7063A-WA

CD Recordable/ReWritable

New Basic Model Arrived in RICOH CD-R/RW Drive series. Not only to store or to backup your data but also to make a collection of digital pictures taken by a digital camera or to record your original audio CD. MP7063A-WA makes your PC life expanded.

- MP7063A-WA CD-R/RW drive(ATAPI Interface)
- Easy CD Creator™4, DirectCD™ 3 software
- 1 CD-R disc and 1 DirectCD pre-formatted CD-RW disc
- Mounting screws & Audio cable



GST Ex \$354 + GST \$35.40
(A3300)

\$389.40



NEW!

MP7120A

Amazingly Fast CD-RW at 10x!!

With the MP7120A, Ricoh once again stretches the boundaries of the CD-RW world. Fully compatible with the new High Speed CD-RW standard.

- Internal MP7120A CD-R/RW drive (ATAPI Interface)
- Includes 1x CD-R disc and 1x High Speed CD-RW disc
- Up to 12x Write speed
- Up to 10x Rewrite speed with high speed CD-RW disc media.
- 4Mb Buffer memory
- 16.7MB/Sec (Max) data transfer rate (at I/F)

GST Ex \$470 + GST \$47.00
(A5385)



\$517.00



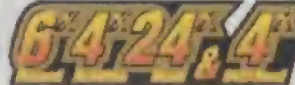
MP9060A

Four-in-one Power!

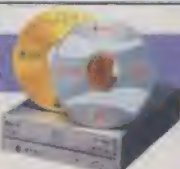
All your CD Business needs... PLUS DVD Entertainment!

- MP9060A CD-R/RW and DVD-ROM drive(ATAPI Interface)
- EasyCD Creator4.0Standard (premastering software)
- DirectCD 3.0 (packet writing software)
- SOFTWARE CINEMASTER (DVD playback software)
- 1 DirectCD preformatted CD-RW disc
- 1 CD-R disc
- Quick start guide, Audio cable, Mounting screws

GST Ex \$521 + GST \$52.10
(89172)



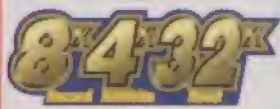
\$573.10



MP7080

Store Your Best Ideas, Faaaast

Be ready whenever the inspiration strikes, with the lightning fast Rich MP7080 Series.



- MP7080A-WA xCD-R/RW drive(ATAPI Interface)
- Easy CD Creator™4.0, DirectCD™ 3.0 software
- 1 CD-R disc and 1 DirectCD pre-formatted CD-RW disc
- Quick start guide, Mounting screws, Audio cable

GST Ex \$440 + GST \$44.00
(93924)

\$484.00

OCT
30

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TECHNOLOGY™**

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Finance methods
subject to approval

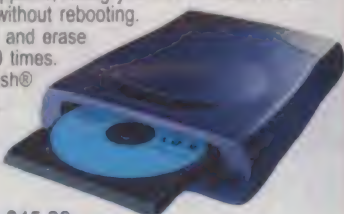
Smart Storage Solutions

Check for
latest prices
& products

CD-RW External 4x4x6

The ZipCD™ external USB drive reads, writes and rewrites most CD formats. You can use it to record, back up, and share your files.

- It's portable and hot-swappable, letting you connect it to all USB-enabled computers without rebooting.
- It enables you to record and erase ZipCD™ discs up to 1000 times.
- Enable PC and Macintosh® computer users to record, archive, share, and distribute up to 650MB of data on a common CD format.



GST Ex: \$452 + GST: \$45.20
(92623) GST Inc: **\$497.²⁰**

ZIPCD USB

CD-RW Internal

Now Available in 8x4x32 & 12x4x32

Iomega ZipCD Internal drive is the ideal way to store, share and archive information in a common 650MB format.



NEW!

8x4x32:
GST Ex: \$363 + GST: \$36.30 (97712) GST Inc: **\$399.³⁰**
12x4x32:
GST Ex: \$578 + GST: \$57.80 (A54391) GST Inc: **\$635.⁸⁰**

Zip 250MB

Provides high-capacity storage in an easy-to-use format that can go from desktop to laptop quickly and reliably. Sleek new design. Connect via USB port or through PCMCIA card version which requires no additional power cables. Backward compatible with 100MB Zip media.

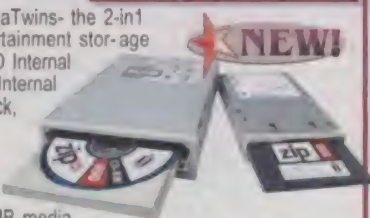


Zip 250MB USB:
GST Ex: \$294 + GST: \$29.40 (82633) GST Inc: **\$323.⁴⁰**
Drive USB/PC card Combo
GST Ex: \$353 + GST: \$35.30 (82780) GST Inc: **\$388.³⁰**

ZIP USB

ZipCD & Zip 100MB

Introducing the new MegaTwins- the 2-in1 complete data and entertainment storage solution. Offering a ZipCD Internal drive, and a Zip 100MB Internal Atapi drive all in one pack, the MegaTwins is the complete solution for managing your information. Also comes with CD-R and Zip 100MB media.



NEW!

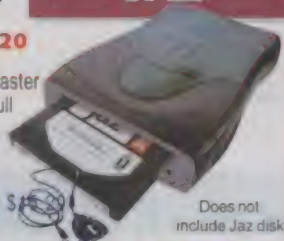
GST Ex: \$428 + GST: \$42.80 (A5399) GST Inc: **\$570.⁸⁰**

MegaTwins

Jaz 2GB External

GST Ex: \$562 + GST: \$56.20
(78941) GST Inc: **\$618.²⁰**

The external Jaz 2GB drive is faster than many hard drives, has a full 2GB of storage space in each removable disk.



Disk Single:
GST Ex: \$152 + GST: \$15.20 (61652) GST Inc: **\$167.²⁰**
Disk 3-pack:
GST Ex: \$463 + GST: \$46.30 (57271) GST Inc: **\$509.³⁰**
Jaz Firewire dongle: SCSI to USB connector
COMING SOON!!!

JAZ

PC Card Drive

Removable solution for notebook users. Store, protect and share important information on a 40MB Klik! (1 disk included).

CLIK!



Click! USB docking station
GST Ex: \$109 + GST: \$10.90 (A2306) GST Inc: **\$119.⁹⁰**
Click! Drive PC Card and disk
GST Ex: \$237 + GST: \$23.70 (78902) GST Inc: **\$260.⁷⁰**
Click! Drive Mobile
GST Ex: \$445 + GST: \$44.50 (76743) GST Inc: **\$489.⁵⁰**
Click! Disks 10-pack
GST Ex: \$169 + GST: \$16.90 (75985) GST Inc: **\$185.⁹⁰**

Zip 100MB USB Starter kit

NEW

USB Easy to connect.
Comes with 3 disks.
Plug it in, connect the USB cable to the computer, and install the IomegaWare™ software. Done!



XMAS PROMO

Stimulate your Cyber Senses with Iomega this Christmas!

Announcing an exciting new promotion from Iomega sure to stimulate your Cyber senses! With any purchase of an Iomega Zip, Jaz, Klik! or ZipCD drive from 1 October, you can enter the draw to win the latest in digital technology. Up for grabs are MP3's, DVD's, iPaq's and more!

GST Ex: \$235 + GST: \$23.50 (A2308) GST Inc: **\$258.⁵⁰**

Zip 100MB disk:
(23772)
GST Ex: \$16 + GST:
\$1.60 GST Inc: **\$17.60**
10-pack:
(21889)
GST Ex: \$143 + GST:
\$14.30 GST Inc: **\$157.30**
Zip PCMCIA SCSI
accelerator card
(35145)
GST Ex: \$158 + GST:
\$15.80 GST Inc: **\$173.80**
Zip ISA SCSI Zoom
accelerator card
(21888)
GST Ex: \$53
+ GST: \$5.30
GST Inc: **\$58.30**
Zip drive carry case
(31823)
GST Ex: \$42 + GST:
\$4.20 GST Inc: **\$46.20**
Zip parallel cable
(46305)
GST Ex: \$35 + GST:
\$3.50 GST Inc: **\$38.50**
Zip SCSI cable
(46304)
GST Ex: \$33
+ GST: \$3.30
GST Inc: **\$36.30**
Zip disk labels 20-pack
(48059)
GST Ex: \$3 + GST:
\$0.30 GST Inc: **\$3.30**
Zip 6-disk wallet
(35146)
GST Ex: \$23 + GST:
\$2.30 GST Inc: **\$25.30**
Jaz 1GB disk (24218)
GST Ex: \$144 + GST:
\$14.40 GST Inc: **\$158.40**
3-pack
(32844)
GST Ex: \$409 + GST:
\$40.90 GST Inc: **\$449.90**
Jaz PCMCIA SCSI card
(44744)
GST Ex: \$196
+ GST: \$19.60
GST Inc: **\$215.60**
Jaz universal
power supply
(35154)
GST Ex: \$44 + GST:
\$4.40 GST Inc: **\$48.40**
Click! Power Supply
(78925)
GST Ex: \$26
+ GST: \$2.60
GST Inc: **\$28.60**

See www.ht.com.au/cat/iomega for more info on these products

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Fax: 1300 13 6666

Website: www.ht.com.au
E-mail: sales@ht.com.au

Delivery
Australia Wide

Next Generation Backup Solutions

More from Digital Tape Solutions
Quantum
DLT4000/ST
GST Ex \$1,900
+ GST \$190.00
(70917)
GST INC
\$2,090.00

Quantum
DLT7000/ST.
GST Ex \$6,781
+ GST \$678.10
(41608)
GST INC
\$7,459.10

Quantum
DLT8000/ST.
GST Ex \$6,896
+ GST \$689.60
(82501)
GST INC
\$7,585.60

DLTape media
DLT2000XT 15/
30GB Tape
GST Ex \$73
+ GST \$7.30
(68362)
GST INC
\$80.30

DLT4000 20/
80GB Tape
GST EX \$128
+ GST \$12.80
(71231)
GST INC
\$140.80

DLTclean
Cleaning Tapes
GST Ex \$73
+ GST \$7.30
(97851)
GST INC
\$80.30

MaxAttach NAS System

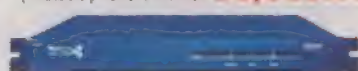


Simplest way to add file services to any NT or Unix Network

MaxA40: 40Gb
GST Ex \$2,780 + GST \$278.00
(A2201) GST INC **\$3,058.00**

MaxC80: 80Gb
GST Ex \$3,908 + GST \$390.80
(A2204) GST INC **\$4,298.80**

MaxC160: 160Gb
GST Ex \$5,530 + GST \$553.00
(A2205) GST INC **\$6,083.00**



- Simply plug into your ethernet
- Only 5 mouse clicks to install....
- In 10 minutes you have 40, 80 or 160Gb of disk storage on line.
- Simple Web Browser administration.
- No NT licenses to buy!
- 95/98NT and Unix network compatible
- Now in 1 RU high models (4.5 cm high)
- Disk Spanning, JBOD or Raid level 1 built-in
- Free Reflect-It software to automatically backup you laptops or PCs.

Backup Software - TapeWare

TapeWare Lite: Single Server backup for NT, Network or Linux



GST Ex \$425 + GST \$42.50
(97849) GST INC **\$467.50**

TapeWare - Loaded with features yet simple to use. TapeWare is simple to install and easy to administer whether you have a single PC or a large enterprise network.

- Quick Start Wizards set up most common applications quickly
- Advanced and predefined scheduling features
- Built in free 6 slot autoloader support
- Desktop, Single Server, Enterprise and Data Centre Versions
- Options for MS-Exchange, Cluster, SQL, SAN etc

Tandberg SLR Tape Drives



"Designed for price performance and superior reliability"

SLR40 (Internal)
• 20Gb native, 40 compressed
• 3-6Mb sec, 21 Gb/hour
GST Ex \$2497 + GST \$249.70

(A2313) GST INC **\$2,746.70**
SLR60 (Internal)
• 30Gb native, 60 compressed
• 4-8Mb sec, 28 Gb/hour
GST Ex \$2,870 + GST \$287.00

(A2206) GST INC **\$3,157.00**
SLR100 (Internal)
• 50Gb native, 100Gb compressed
• 5-10Mb sec, 36 Gb/hour
GST Ex \$4,817 + GST \$481.70

(A2207) GST INC **\$5,298.70**

ECRIX VXA-1 Tape Drive

INTERNAL GST Ex \$1,558 + GST \$155.80 (91106) GST INC **\$1,713.80**

EXTERNAL GST Ex \$1,649 + GST \$164.90 (91110) GST INC **\$1,813.90**



- 33 GB Native, 66GB compressed
- 3-6MB sec sustained, that's 21.6GB/Hr
- SCSI-2 and LVD models available
- Variable speed operation matches data throughput to your computer
- Packet based technology guarantees reliable restores
- LINUX approved
- Variety of case colours (*White, black, red, translucent)
- Compatible with most backup software

Benchmark DLT1 Tape Drive



INTERNAL
GST Ex \$2,986
+ GST \$298.60 (88037)

GST INC **\$3,284.60**
EXTERNAL GST Ex \$2,908 + GST \$290.80
(88038) GST INC **\$3,198.80**

- 40GB native, 80GB compressed
- 3-6MB sec sustained, that's 21.6GB/Hour
- Ultra Wide SCSI LVD interface
- Reads DLT4000 tapes (20/40Gb Only)
- Internal or External models
- LINUX Approved
- 7 tape autoloader available
- Compatible with most common backup software
- Standard DLT form factor

Overland DLT1 Based Autoloader



"Lowest Cost DLT compatible Autoloader on the market"

- 400 Gb native, 800 Gb compressed capacity
- DLT1 Single Tape Drive included
- 10 tape capacity
- Overland DLT reliability
- LVD 68 pin SCSI Interface
- Includes 1 data tape and cable
- 20 Gb/Hr throughput.
- Optional On-site warranty.

GST Ex \$7,786 + GST \$778.60
(A0476) GST INC **\$8,564.60**

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Shop at
HARRIS TECHNOLOGY
and collect
Fly Buys
Points!

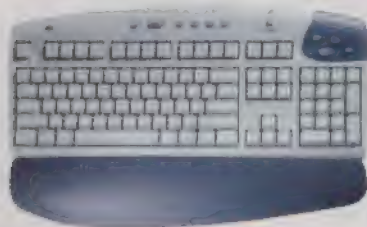
32



Surround yourself with the very best

Cordless Desktop iTouch

A cordless keyboard and cordless wheel mouse combination to free you from cords that tangle. No pointing at the computer or clear path required. With convenient iTouch Internet and multimedia controls. Five-year warranty.



GST Ex: \$152
+ GST: \$15.20
(82772)
GST Inc:

\$167.²⁰

Cordless Desktop Pro

Cordless keyboard designed for easier typing and contoured soft-touch cordless wheel mouse free you from tangled cords. Innovative mouse design maximises comfort and control. Five-year warranty.



GST Ex:
\$206
+ GST:
\$20.60
(87605)
GST Inc:

\$226.⁶⁰

Cordless Wheel Mouse Special Edition

Personalise your mouse with the three different colored snap-on backs. The Cordless Wheel Mouse frees you from cords that catch, tangle and limit your movement. The rounded shape is comfortable for left or right hand. 5-year warranty.

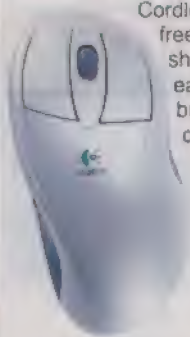


GST Ex: \$72 + GST: \$7.20

(A2300) GST Inc: **\$79.²⁰**

Cordless MouseMan Wheel

Cordless MouseMan Wheel combines cordless freedom of movement and a comfortable shape with unique soft-touch sides, an easy-scrolling wheel and four customizable buttons. It eliminates the struggle with cords, works without being pointed at the computer and performs on crowded desks. Five-year warranty.



GST Ex: \$81 + GST: \$8.10

(78677) GST Inc: **\$89.¹⁰**

NEW LOW PRICE

Mini Wheel Mouse

GST Ex: \$64
+ GST: \$6.40
(97717)
GST Inc:

\$70.⁴⁰



MouseMan Wheel Optical

GST Ex: \$89
+ GST: \$8.90
(A3057)
GST Inc:

\$97.⁹⁰



Wheel Mouse Optical

GST Ex: \$71
+ GST: \$7.10
(A5318)
GST Inc:

\$78.¹⁰



QuickCam™ Express

Snap stills. Shoot video. Email them anywhere in one click. Make live video calls! **QuickCam™ Express** – The simple way to get closer™.

- Capture stills and video instantly
- Email images with a single click
- Meet face-to-face online
- Over 3 million QuickCams sold
- USB connector for easy installation
- Works with Windows® 95 or 98



GST Ex: \$81 + GST: \$8.10

(80121) GST Inc: **\$89.¹⁰**

QuickCam™ Web

The redesigned Logitech QuickCam Web has everything you need to capture video, send video e-mail, make live video calls, post web albums, broadcast over the Internet and more. With its integrated microphone and excellent assortment of easy-to-use software, QuickCam Web is the perfect Internet video camera for everyone.



GST Ex: \$158
+ GST: \$15.80

(A2833) GST Inc: **\$173.⁸⁰**

Soundman S-20

★ NEW!



Delivers high-definition sound, solid bass for your favourite CD/MP3 songs. Compact, attractive styling. Remote control with headphone jack. Includes digital music CD. 2-year warranty.

GST Ex: \$90 + GST: \$9.00

(A5011) GST Inc: **\$99.⁰⁰**

Soundman SR-30

★ NEW!



Enhance your gaming experience with realistic surround sound. Powerful subwoofer and 4 satellite speakers in an attractive package. Remote control with headphone jack. 2-year warranty.

GST Ex: \$158 + GST: \$15.80

(A5343) GST Inc: **\$173.⁸⁰**

Kodak



Web Direct

www.hi.com.au/cat/kodak

Taking Pictures Further

Kodak DC5000

Rugged, durable, and easy-to-use, the KODAK DC5000 will help you get the job done. Whether you're in the construction industry, insurance, or an outdoor enthusiast, the DC5000's weatherproof body will hold up under the toughest circumstances. Two-megapixel resolution provides you with excellent picture quality even on 8" x 10" prints. The 2X optical (30 - 60 mm) and 3X digital zoom let you choose wide angle or telephoto to take pictures in a variety of open spaces. All in all, a practical, intuitive package that is as easy to use as a point and shoot, but tough on the job.



GST Ex: \$1,159 + GST: \$115.90

(A3540) GST Inc: **\$1,274.⁹⁰**

Kodak DC4800

NEW!

For passionate digital photographers or those needing the highest possible quality or the widest creative control: Compact size. 3.3 megapixels - super crisp resolution; prints up to 11"x17". Six image qualities, from e-mail to uncompressed Tif. Loaded with features. Variable ISO settings (100, 200, 400). Wide angle 3x optical zoom plus 2x digital zoom. Lithium ion rechargeable battery (rechargeable in camera). Manual & auto settings. Variable colour balance. TTL AF. Special effects. Lens threaded for additional external lenses. Burst capture mode.* (A3295) GST Inc: **\$1,618.¹⁰**



GST Ex: \$1,471 + GST: \$147.10

Kodak Accessories

32MB

Picture Card

(62677)
GST Ex: \$156
+ GST: \$15.60
GST Inc:

\$171.⁶⁰

64MB

Picture Card

(82249)
GST Ex: \$241
+ GST: \$24.10
GST Inc:

\$265.¹⁰

96MB

Picture Card

(88332)
GST Ex: \$369
+ GST: \$36.90
GST Inc:

\$405.⁹⁰

Premium Camera Bag

(82273)
GST Ex: \$53
+ GST: \$5.30
GST Inc:

\$58.³⁰

80 Minute

Ultima

(94493)
GST Ex: \$2
+ GST: \$0.20
GST Inc:

\$2.²⁰

Kodak Gold

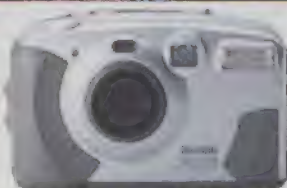
10 Pack

(53993)
GST Ex: \$21
+ GST: \$2.10
GST Inc:

\$23.¹⁰

Kodak DC3400

- Two-megapixel resolution means exceptional detail and brilliance - up to 8" x 10" prints.
- Its 2X optical zoom delivers crisper close-ups, and its 3X digital zoom lets you get even closer.
- User-friendly controls make the DC3400 quick to learn and easy to use.
- Zoom Digital Camera, ensuring high quality and no-nonsense performance.
- Get connected quickly and easily with its USB and serial cables - it's easy to download, organize, and e-mail your pictures.
- Print your pictures with convenience from your own printer.



GST Ex: \$908 + GST: \$90.80

(A5579) GST Inc: **\$998.⁸⁰**

Kodak EZ200

NEW!

Low cost digital point-and-shoot camera that's also a PC/web camera. Compact & light. VGA camera - ideal for easily emailing pictures. Capture short video clips and share via video email. Portable like a traditional camera, but included software also allows camera to be tethered to PC for live video calls. Burst mode for action shots. USB interface. 4Mb internal memory. With removable/adjustable base to allow full tilting & swivelling.



GST Ex: \$Call + GST: \$Call

(xxxxx) GST Inc: **\$Call**

Kodak DVC 325

The KODAK DVC325 Digital Video Camera is the easy, fun way to capture and share quality digital pictures and video

- Full motion video up to 30 frames per second
- Great 640x480 Still Images
- USB Interface
- Create videos that include text, video, audio and special effects with Presto!
- Videoworks software included
- Standard Tripod Socket



GST Ex: \$134 + GST: \$13.40

(80362) GST Inc: **\$147.⁴⁰**

Kodak CD Media

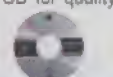
CD-Rs are frequently handled, dropped, scratched, piled on desktops, and baked in hot cars. These situations endanger your data... so we've built KODAK CD-R media tough! In testing, we set out to prove that our discs can survive conditions just like these and worse. CD-R Ultima and Ultima 80 - The only disc that has gold in its silver reflective layer. Lasts up to six times longer than silver-only discs. CD-R Gold Ultima - Professional quality, archival life disc offers twelve times the longevity of silver-only discs. CD-RW - Rewritable CD for quality rewrites, again and again.



CD-R ULTIMA

GST Ex: \$2
+ GST: \$0.20
(87560)
GST Inc:

\$2.²⁰



CD-R ULTIMA 80

GST Ex: \$2
+ GST: \$0.20
(94493)
GST Inc:

\$2.²⁰



CD-R GOLD

GST Ex: \$3
+ GST: \$0.30
(92959)
GST Inc:

\$3.³⁰



CD-RW

GST Ex: \$5
+ GST: \$0.50
(94496)
GST Inc:

\$5.⁵⁰

Kodak PalmPix

- Compatible with Palm III, IIIx, IIIe, VII, IBM Workpad and TRGPro.
- Portable: Take it everywhere
- Quick- take a picture, transfer by HotSync technology, and share it in seconds
- Color VGA Pictures- 640x480 pixel resolution.
- Zoom- 2x digital zoom
- Windows 95, 98, nT 4.0 or later compatible



GST Ex: \$281 + GST: \$28.10

(A2310) GST Inc: **\$309.¹⁰**

Kodak 4832 External USBWriter

NEW USB, 4x CDR Write, 4x CDRW Re-Write, Up to 8x Read. Dimensions 195(w) x 60(h) x 247(d) mm, Weight 2.53Kg. USB supported by Windows 98. PACKAGE CONTENTS- Your Kodak USB CD-R/RW drive, Recording Software CD and CD-R/RW drive Driver CD, USB connection cable, Power cable with universal power supply, KODAK Ultima CDR, KODAK 4832e User Manual. (A2330) GST Inc: **\$584.¹⁰**



GST Ex: \$531 + GST: \$53.10

(A2330) GST Inc: **\$584.¹⁰**

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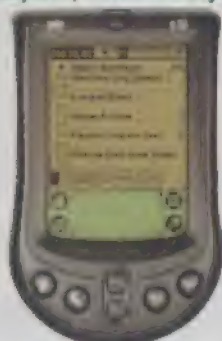
Excellent Palm™ Computing from Harris Technology

Palm™ handheld computers manage life's little details. It will help you stay on top of things everywhere you go. You can store thousands - literally thousands - of names, addresses, phone numbers, to-do's, and expenses, plus hundreds of e-mail messages. You can synchronise all your information with your desktop computer at the touch of a button. More features: Infrared communication. Access your e-mail with the Palm Modem® accessory. Applications: Date Book, Address Book, Mail, To-do List, Memo Pad, Expense, Calculator, Security, Games, HotSync®.



Palm m100

Handheld Computer
Compact, slim & stylish



Easy to use. Intuitive is the perfect word to describe how easy the m100 is to use. You instinctively know how to get it up and running right out of the box. Convenient Notepad. Got a thought? Jot it down directly on the screen in a virtual "sticky note" for quick reminders. Clock. The m100 features a convenient clock positioned for at-a-glance timekeeping. Customizable. Change the color of your handheld with an assortment of snap-on faceplates. Plus, add on any of the thousands of software applications available, from business productivity tools to games. Many are free.

GST Ex \$327 + GST \$32.70
(A4839) GST INC
\$359.70

Palm IIIc™

Handheld Computer
Colorful

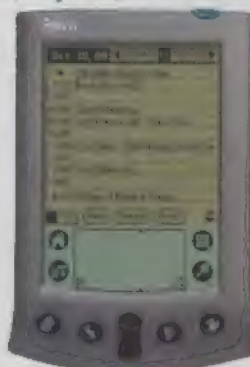


The Palm IIIc™ combines functionality and speed with advanced screen technology that renders a vivid, clear colour display. A rechargeable lithium ion battery lasts more than two weeks with normal use, and recharges in your HotSync® cradle in just minutes a day. An optional recharger kit is great when you're away from your PC. Stores approximately: 10,000 addresses, 5 years of appointments, 3,000 to-do items, 3,000 memos, 400 e-mail messages and lots of third-party applications.

GST Ex \$690 + GST \$69.00
(95059) GST INC
\$759.00

Palm Vx™

Handheld Computer
Slim, stylish, more storage

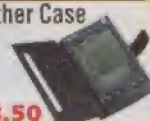


If you're looking for the sleekest device on the market, look no further than the Palm Vx™ handheld computer. Weighing in at just 114 grams., it has the same anodised aluminum exterior and LCD screen as the Palm V™ handheld computer. Yet it has four times the memory of its predecessor, giving you more speed and more storage. Stores approximately: 10,000 addresses, 5 years of appointments, 3,000 to-do items, 3,000 memos, 400 e-mails and lots of third-party applications.

GST Ex \$663 + GST \$66.30
(95061) GST INC
\$729.30

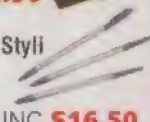
Palm Slim Leather Case

GST Ex \$35
+ GST \$3.50
(63801)
GST INC **\$38.50**



Palm III 3-pack Styli

GST Ex \$15
+ GST \$1.50
(60675) GST INC **\$16.50**



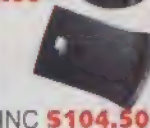
Palm III Cradle

GST Ex \$50
+ GST \$5.00
(60673)
GST INC **\$55.00**



Palm V Cradle

GST Ex \$95
+ GST \$9.50
(74669) GST INC **\$104.50**



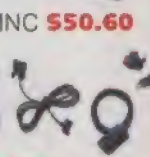
Palm V Leather Belt Clip Case

GST Ex \$46
+ GST \$4.60
(74673) GST INC **\$50.60**



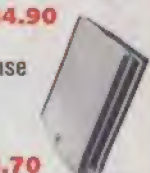
Palm V Modem

GST Ex \$259
+ GST \$25.90
(74668)
GST INC **\$284.90**



Palm V Hard Case

GST Ex \$67
+ GST \$6.70
(74676)
GST INC **\$73.70**



Palm V Travel Kit

HotSync cradle, plug adapters and AC charger
GST Ex \$82
+ GST \$8.20
(74677) GST INC **\$90.20**



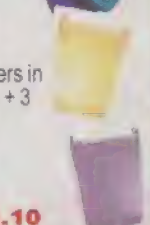
Palm III series PalmGlove

Black:
GST Ex \$44
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(82231)
GST INC **\$48.40**
Also avail: purple, olive, royal blue, teal and yellow



Palm III series Colour Shades

Pack of 3 flip covers in blue, lime & aqua + 3 black plastic styli.
GST Ex \$21
+ GST \$2.10
(60677)
GST INC **\$23.10**



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Leave your laptop in the office. Carry this pocket-sized keyboard to take notes at your next meeting or write reports on an airplane. Folds down small. Weighing in at less than 250 grams, this full-size keyboard tri-folds into a size just slightly bigger than a Palm™ handheld itself. Unfolded, it's the same size as your desktop keyboard. No batteries required.



Tri-fold Keyboard
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(87210) GST INC **\$216.70**

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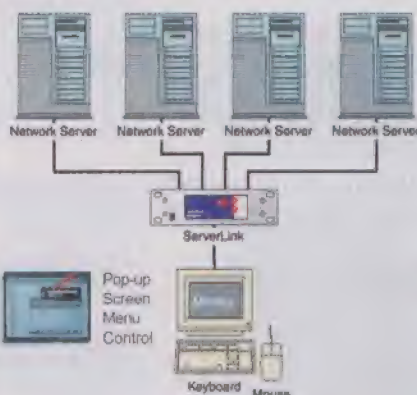
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Multi-Server Controllers

Control up to 256 network servers with a single monitor, keyboard & mouse

3 Year Warranty

With a ServerLink KVM switch you can monitor and fully control up to 256 network servers with just one monitor, keyboard and mouse. Save money on expensive monitors, create more working space and cut down on your power costs.



Designed and manufactured in Australia by an award winning engineering company, ServerLink is packed with features, providing total control of your ever expanding network.

- Select servers via On-Screen-Display or Front Panel
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- Mouse & keyboard emulation for flawless booting
- Scan Mode for periodic server monitoring
- Standard cables used throughout
- Cascadeable to control up to 256 servers
- 8 and 16 port models 19 inch rack mounted design
- Australian designed and manufactured

FROM **\$349.⁸⁰**

ServerLink to computer cable

Each end of the cable fans out into three connectors: 2m cable for PS/2 mouse, keyboard and monitor
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GST INC **\$27.50**

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GST Ex \$56 + GST \$5.60 (63977)
GST INC **\$61.60**

ServerLink™

- EPROM upgradeable for future technology
- Supports PS/2 and Serial mouse emulation



SL-401E	4 Port ServerLink Controller for PS/2 only	GST Ex \$318 + GST \$31.80 (71652) GST INC \$349.⁸⁰
SL-401	4 Port ServerLink Controller	GST Ex \$670 + GST \$67.00 (63724) GST INC \$737.⁰⁰
SL-801	8 Port ServerLink Controller	GST Ex \$1,119 + GST \$111.90 (63777) GST INC \$1,230.⁹⁰
SL-1601	16 Port ServerLink Controller	GST Ex \$1,881 + GST \$188.10 (63778) GST INC \$2,069.¹⁰

SERVERLINK INFINITY

PS-2 ONLY

- Password protection for security
- Flash ROM upgradeable for future technology



SL-821	8 Port ServerLink Infinity controller	GST Ex \$974 + GST \$97.40 (97888) GST INC \$1,071.⁴⁰
SL-821-P	8 Port ServerLink Infinity controller incl 8x2m Cables	GST Ex \$1,131 + GST \$113.10 (97889) GST INC \$1,244.¹⁰
SL-1621	16 Port ServerLink Infinity controller	GST Ex \$1,633 + GST \$163.30 (97890) GST INC \$1,796.³⁰
SL-1621-P	16 Port ServerLink Infinity controller incl 16x2m Cables	GST Ex \$1,934 + GST \$193.40 (97891) GST INC \$2,127.⁴⁰

QCT 36

Professional Video Tools



EZDV

From the makers of the award winning DVRaptor:
Fast, Friendly and Easy DV Editing for your desktop.



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- SoftXplode 2D and 3D special effects software (included)
- High Speed filtering and image enhancements

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+ GST \$54.20
(97877) GST INC

\$596.20

DV Raptor



The DV Raptor bundle includes:
the award winning DVRaptor
Premiere, SoftXplode:
keyframeable 2D & 3D effects
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with real-time "assemble" and "insert"
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and title authoring • SmartSound,
soundtrack creation software. Impact3D
and Adorage software. ** PLUS ** Raptor
Bay and all the traditional high quality
utilities that have made DVRaptor
Australia's best selling DV editing system.

GST Ex \$1,237
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ACID MUSIC 2.0



The one software package you need to create
professional music in any style imaginable
including rock, techno, funk, hip-hop, and more!
This software is as easy as Pick, Paint and
Play. You'll be able to create and edit your
composition instantly. Now with MP3 encoding
built in.

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Acid DJ, Rock or Hip Hop

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Sound Forge 4.5XP

GST Ex \$635 + GST \$63.50 (49647) GST INC

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GST Ex \$832 + GST \$83.20 (A5599) GST INC

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Professional Realtime Editing for
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Sonic DVDIt!

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HaupApage TV



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WinTV • Watch Live TV or video on
your PC while surfing the Web..(in a
window or full screen). • Channel surf
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AVI file format - from TV or any video
source • Video conference over the
Internet with Microsoft NetMeeting or
CU-SeeMe. • Create home movie
AVI's and send them to friends via e-
mail.
- Win 95, 98, NT 4.0, Win2000 and
Linux.

GST Ex \$151.00
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(89063) GST INC

\$166.10



GST Ex \$195 + GST \$19.50 (89064) GST INC

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Hauppage TV GO- FM

GST Ex \$280 + GST \$28.00 (89065) GST INC

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Hauppage TV Radio

GST Ex \$232 + GST \$23.20 (89066) GST INC

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Hauppage TV USB

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DV500

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- Capture and output analogue and/or DV videos



(87676)
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\$2,197.80

DV200

- Full version of Adobe premier v5.1
- True digital / firewire capture card, for professionals
- Firewire cable & Miro Tools software to overcome 2 gig file size limitation
- 2 external firewire ports



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GST INC

\$1,135.20

Studio DV

- Capture, Edit and Output DV quality videos
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- Edit your DV Video's With Studio software
- Create Video CDs and Streaming videos
- SmartCapture technology saves Hard disk space



(87677)
GST Ex: \$271 + GST: \$27.10
GST INC

\$298.10

DC30 Plus

- The professional choice for Analogue Video Capture / Editing, with Composite & S-VHS IN/OUTPUTS
- Full Version Adobe Premier V5.1
- Full version Acid Audio editing software with on Board Audio, (avoid lip Sync issues)
- Blue Break out Box



(31696)
GST Ex: \$1,272 + GST: \$127.20
GST INC

\$1,399.20

Firewire CardBus PC Card

- Video Studio v4 Video Editing Software,
- MPeg-1 / MPeg-2 Editing
- Runs on Windows & Mac Platform



(A1751)
GST Ex: \$323 + GST: \$32.30
GST INC

\$355.30

**Orange Mikro
Inc.**

Studio DC10 Plus



Studio DC10 Plus is an affordable desktop video editing solution with the power, features and performance expected in higher end solutions. Captures and outputs full screen video at PAL or

- NTSC standard, includes the famed miro-INSTANT VIDEO to break the 2GB barrier for Windows. Comes with some great software to assist you with your editing!

(75800) GST Ex: \$484 GST: \$48.40

GST INC \$532.40

Studio MP10

- External easy-to-set up parallel port device.
- Capture video's into your PC.
- Edit your videos using Studio software
- Create Multimedia and Video CDs
- Archive your old videos on CD Rom
- Create Streaming Videos for the net



(80256)

GST Ex: \$590 GST: \$59.00 GST INC: **\$649.00**

Studio PCTV USB

- All the features of PCTV Pro
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- Take Still image using "Snap Shot" button



(85878)

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Sound you will not believe!

ACS 22 Tower Speaker System



GST Ex \$52.00
+ GST \$5.20

\$57.20 GST Inc
(90501)

- Produces powerful audio output from two satellites.
- Maintains a small footprint while delivering high quality sound.
- Delivers quality PC audio to the value-orientated consumer.
- Convenient stereo headphone output.

ACS 33 3 Piece Speaker System



GST Ex \$80.00
+ GST \$8.00

\$88.00 GST Inc
(90503)

- 3 Piece system dramatically enhances PC audio.
- Compact speaker satellites are powered and magnetically shielded.
- Powered subwoofer extends the low frequency response to add realism and bass.
- Volume control and power on LED.

ACS 54 PowerPlay™ Plus for Gamers



GST Ex \$176.00
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\$193.60 GST Inc
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- Powerful 40 Watt, high performance 5-piece system.
- Compact speaker satellites are powered and magnetically shielded.
- Unique bracket/stands provide convenient mounting possibilities for surround speakers.
- Powered wood subwoofer extends the low frequency response to add realism and bass.

ATP 3 3 Piece System



GST Ex \$209.00
+ GST \$20.90

\$229.90 GST Inc
(A5538)

- Two dynamic microdrivers in each satellite deliver all the power and performance of a larger speaker.
- Down-firing 3" mid/bass driver reproduces low-end frequencies for full, rich sound. Speakers are magnetically shielded to prevent monitor interference.
- Powered wooden subwoofer extends the low frequency response for realistic sound.

ABA 2020 VoicePod™

VoicePod™ is a unique record and playback device providing the ultimate in high quality voice reproduction for personal computers and the simplest and most efficient method of recording and sending email messages.

Record & attach voice messages to Windows files & E-mail — Add voice notes to documents, drawings & photographs — Hear clean, clear, rich playback of voice messages.



GST Ex \$170.00
+ GST \$17.00

\$187.00 GST Inc
(A5541)



AIM 4040 IntelliMic™

IntelliMic™ is a high quality microphone for use with personal computers providing the ultimate capability to eliminate background noise and interference.

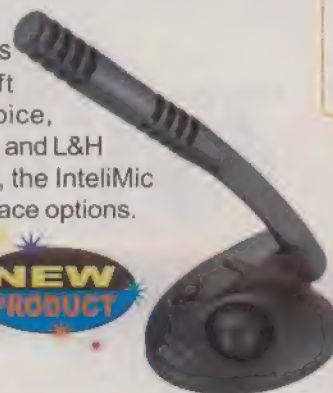
Capture voice & audio with maximum control of recording environment — Enhances internet telephony & voice recognition accuracy — Provides unparalleled recording flexibility & clarity — Software supplied for on-screen graphic user interface.

Compatible with programs such as Microsoft NetMeeting, IBM Via Voice, Dragon Naturally Speaking, and L&H Voice Express, and others, the IntelliMic offers many software interface options.



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+ GST \$9.00

\$99.00 GST Inc
(A5542)



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Let's Make Things Better!



107P10
17" Real Flat Monitor

GST Ex: \$713
+ GST: \$71.30
(96590) GST Inc:

\$784.³⁰

Plug and Play **pc world**

- Award Winner! Review from PC World April 2000 edition.
- The 17-inch (16.0" VIS) Brilliance 107P Real Flat monitor with a 0.25 mm Aperture Grille tube has a maximum horizontal frequency of 96 kHz.
- Maximum resolution of 1920x1440 with flicker free display of 1024 x 768 at up to 120 Hz.
- Dual inputs allows the simultaneous connection to two computers while CustoMax™ offers outstanding ease of use.



109P10
19" Real Flat Monitor

GST Ex: \$1062
+ GST: \$106.20
(96591) GST Inc:

\$1,168.²⁰

- Award Winner! Review from PC Authority August 2000 edition.
- The 19-inch (18.0" VIS) Brilliance 109P Real Flat monitor is designed for demanding professional users.
- 0.25 mm Aperture Grille tube has a maximum horizontal frequency of 110 kHz, offering a maximum resolution of 1920 x 1440 with flicker free display of 1280 x 1024 at up to 103 Hz.
- An exclusive Auto Calibrate feature is included that guarantees consistent performance and extends the useful life of the monitor by one third.



201P10
21" Real Flat Monitor

GST Ex: \$1817
+ GST: \$181.70
(45876) GST Inc:

\$1,998.⁷⁰

- The 21-inch (20.0" VIS) Brilliance 201P Real Flat monitor is designed for demanding professional users who require a large screen size.
- 0.24 mm Aperture Grille tube has a staggering maximum horizontal frequency of 121 kHz, offering a maximum resolution of 2048 x 1536 with flicker free display of 1600 x 1200 at up to 97 Hz.
- An exclusive Auto Calibrate feature is included that guarantees consistent performance and extends the useful life of the monitor by one third.

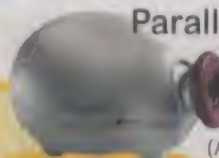


Vesta Camera

GST Ex: \$124
+ GST: \$12.40
(A1191) GST Inc:

\$136.⁴⁰

USB PC Camera - Vesta
USB Connection for true plug and play with Windows 98/2000 PC. Draws power from PC/USB hub. Supplied with image capture & Videogram software. Snapshot Button for capturing still shots from the desktop. Max Resolution 640x480 @ 15fps Perfect for desktop conferencing, Internet and video mail.

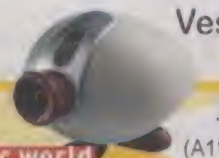


Parallel Port PC Camera

GST Ex: \$150
+ GST: \$15.00
(A1190) GST Inc:

\$165.⁰⁰

Connects via Parallel Port. Supplied complete with cable, power supply, image capture & videogram software. 1/4" CCD Optical System, Max Resolution 320 x 240 @ 15fps Perfect for Internet or video mail. Note: Not for Windows NT 4.0



Vesta PRO Camera

GST Ex: \$176
+ GST: \$17.60
(A1192) GST Inc:

\$193.⁶⁰

USB Connection for true plug and play with Windows 98/2000 PC. Draws power from PC/USB hub. Supplied with image capture, video editing & Videogram software. Max Resolution 640x480 @ 30fps. Snapshot Button for capturing still shots from the desktop. This product allows 'real time' video capture at NTSC quality with a suitable PC configuration. Perfect for desktop conferencing, Internet and video mail.

MMS280 Stereo Speakers
With Active Subwoofer



GST Ex: \$136
+ GST: \$13.60
(72844) GST Inc:

\$149.⁶⁰

- Active 40W (RMS) 2 speaker
- Plus Subwoofer System
- 480W PMPO
- Frequency Range 35-20,000 Hz
- Incredible Surround and
- Dynamic Bass Boost features

DSS350 USB Stereo Speakers

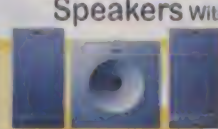


GST Ex: \$121
+ GST: \$12.10
(72845) GST Inc:

\$133.¹⁰

Uses the USB port with Win 98/2000 PC's - no sound card required. Uses Self Oscillation Class D Amplifier Delivering 30W (RMS) 360W PMPO Line In jack for Analogue Support. Incredible Surround and Dynamic Bass Boost features.

DSS370 USB Stereo Speakers
With Active Subwoofer



GST Ex: \$216
+ GST: \$21.60
(72847) GST Inc:

\$237.⁶⁰

All the benefits of DSS350 with Active Subwoofer included. Frequency Range 35-20,000 Hz System Power 60W RMS 720W PMPO Uses the USB Port on a Win98 or Win2000 PC - no sound card needed.



Philips Monitors 3 Year On-Site Warranty

Philips Australia provides a three year parts and labour on-site warranty to the original purchaser. A swap-out monitor will be provided to the customer within 24 hours by Philips.

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3 YEAR ON-SITE WARRANTY*



Hitachi CM 715 19" Monitor

The exceptionally compact Hitachi CM715 19" Monitor provides brilliant clarity with the sharpest dot pitch available.

GST Ex: \$860 + GST: \$86.00
(97803) GST Inc:

\$946.00

- ✦ 0.22mm horizontal mask pitch for superb clarity.
- ✦ 1600 x 1200 maximum resolution at 75Hz.
- ✦ 18" viewable image area.
- ✦ Scored highly across the board in independent testing.

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CM 615 17" Monitor



GST Ex: \$461
+ GST: \$46.10
(97802) GST Inc:

\$507.10

- ✦ 0.23mm horizontal mask pitch
- ✦ 16" Viewable image area
- ✦ 1280 x 1024 at 60Hz

CM 771 19" Flat Screen



GST Ex: \$1,117
+ GST: \$111.70
(97804) GST Inc:

\$1,228.70

- ✦ 0.22mm horizontal mask pitch
- ✦ 18" Viewable image area
- ✦ 1600 x 1200 at 75Hz

CM 811 21" Monitor



GST Ex: \$1,597
+ GST: \$159.70
(70914) GST Inc:

\$1,756.70

- ✦ 0.22mm horizontal mask pitch
- ✦ 20" Viewable image area
- ✦ 1600 x 1200 at 75Hz

CM 813 21" Performance

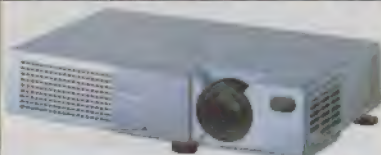


GST Ex: \$1,717
+ GST: \$171.70
(70915) GST Inc:

\$1,888.70

- ✦ 0.22mm horizontal mask pitch
- ✦ 20" Viewable image area
- ✦ 1856 x 1392 at 75Hz

CP-S220 LCD Projector

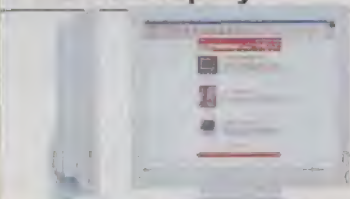


GST Ex: \$5,090 + GST: \$509.00

(A2272) GST Inc: **\$5,999.00**

- ✦ Short Throw Distance - ensures large images even in limited spaces
- ✦ Ultra-Slim Unit (only 60mm high)
- ✦ Light Weight (only 2.4kg)
- ✦ Low-noise operation (34dB)

CMP 205SXU 25" Colour Plasma Display



GST Ex: \$12,681 + GST: \$1,268.10

(A2269) GST Inc: **\$13,949.10**

- ✦ 0.39mm pixel pitch
- ✦ 19.6" x 15.7" effective display area
- ✦ 1280 x 1024 at 75Hz



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Stunning Performance...

AT BREAKTHROUGH SPEEDS

The Tektronix Phaser 850 is nothing less than an exceptional, network-ready, powerhouse colour printer. It's in a class of its own. Extremely easy to use, it also boasts surprisingly flexible paper handling and automatic two-sided printing.



BREAKTHROUGH SPEEDS

- up to 14 pages per minute

UNBEATABLE POWER

- 200MHz processor

DAZZLING COLOUR

- up to 1200 dpi and ColorSync savvy, Adobe PostScript 3

FREE BLACK INK

- means low cost per print

ON-BOARD NETWORKING

- 10/100BaseT Ethernet or native USB

Tektronix
Phaser 850
Colourstix
with Free
Black

Cyan

GST Ex \$153 +
GST \$15.30
(92500)

\$168.⁰⁰

Magenta

GST Ex \$153 +
GST \$15.30
(92501)

\$168.⁰⁰

Yellow

GST Ex \$153 +
GST \$15.30
(92502)

\$168.⁰⁰



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A3 colour
lasers!

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Model	Tektronix	850/N	850/DP	850/DX
Resolution		800 dpi	1200 dpi	1200 dpi
Memory Standard/Max		32 MB (256 MB)	64 MB (256 MB)	128 MB (256 MB)
Built-in Hard Disk		Optional	Optional	6 GB Hard Disk
RISC PowerPC Image Processor		200 MHz	200 MHz	200 MHz
Max. Speed Fast Colour		14 ppm	14 ppm	14 ppm
Max. Speed Standard		8 ppm	8 ppm	8 ppm
Max. Speed Enhanced		4 ppm	4 ppm	4 ppm
Max. Speed High Resolution/Photo		2 ppm	2 ppm	2 ppm
Pipeline Printing		Optional	Standard	Standard
Job Accounting		50 Jobs	500 Jobs	5,000 Jobs
Collation Printing		Optional	Yes	Yes
Duplex Built-in Automatic		Optional	Standard	Standard
Main Paper Tray 200-sheet		Standard	Standard	Standard
Hi-capacity Tray 500-sheet each (two)		Optional	Standard (one)	Standard (one)
Part number		(90162)	(90163)	(90164)
		GST Ex \$4872 + GST \$487.20	GST Ex \$6326 + GST \$632.60	GST Ex \$8178 + GST \$817.80
Price		\$5,359.²⁰	\$6,958.⁶⁰	\$8,995.⁸⁰

¹Requires optional hard disk drive.

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Cartridges for
EPSON Stylus
colour printers
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STYLUS
COLOR 480
GST Ex \$22
+ GST \$2.20
(A0457)
GST INC
\$24.20

Colour Ink for
EPSON
STYLUS
COLOR 480
GST Ex \$32
+ GST \$3.20
(A0726)
GST INC
\$35.20

Black Ink for
EPSON
STYLUS
PHOTO 720
GST Ex \$36
+ GST \$3.60
(70948)
GST INC
\$39.60

Colour Ink for
EPSON
STYLUS
PHOTO 720
GST Ex \$39
+ GST \$3.90
(A2303)
GST INC
\$42.90

Tri-Colour Ink
for EPSON
STYLUS
COLOR 760
GST Ex \$37
+ GST \$3.70
(70092)
GST INC
\$40.70

Black Ink for
EPSON
STYLUS
COLOR 760
GST Ex \$39
+ GST \$3.90
(70091)
GST INC
\$42.90

EPSON STYLUS COLOR 480

GREAT VALUE!

GST Ex \$166.00
+ GST \$16.60
(A0409)
GST INC

\$182.60



The EPSON STYLUS COLOR 480 brings the quality and performance of our PerfectPicture Imaging System within everyone's reach. It offers the fine-grained detail of Ultra Micro Dot printing, and the speed and beauty of Variable-Sized Droplet technology. With its user-friendly on-screen display, you control all printer functions right from your PC! Exclusive to Windows only.

EPSON STYLUS COLOR 760

GST Ex \$399
+ GST \$39.90
(A1451)
GST INC

\$438.90



The new EPSON STYLUS COLOR 760 incorporates the latest state-of-the-art technology to ensure it is right at home meeting the demands of the advanced home and office user. By combining EPSON's Advanced Variable-Sized Droplet technology and Ultra Micro Dots with EPSON's award winning PerfectPicture Imaging System, the EPSON STYLUS COLOR 760 has created a new standard of image quality for the SOHO environment.

EPSON STYLUS PHOTO 720

Resolution:
1440 x720 dpi

GST Ex \$395
+ GST \$39.50
(A0471)
GST INC

\$434.50



The EPSON STYLUS PHOTO 720's high-quality, 6-colour printing ensures superior results on everything from documents to greeting cards, photo stickers and t-shirt transfers. Combining the superior performance of EPSON's PPIS and 1440 dpi resolution, this new printer offers high image quality for the home and small business user. It also features 7 picolitre Ultra Micro Dots to deliver dazzling details superb image quality. Produces images that are so fine-grained, they are virtually indistinguishable from photographs.

EPSON DOUBLE CARTRIDGES

Double Black
Cartridges available for
the following printers...

SAVE!!

Stylus Color 400, 500, 600

GST Ex \$58 + GST \$5.80 (90628) GST INC **\$63.80**

Stylus Color 800, 850, 1520

GST Ex \$70 + GST \$7.00 (90627) GST INC **\$77.00**

Stylus Color 440, 460, 640, Photo1160

GST Ex \$61 + GST \$6.10 (90626) GST INC **\$67.10**

Stylus Color 670, 740, 760, 860, 1160

GST Ex \$70 + GST \$7.00 (90625) GST INC **\$77.00**

Stylus Color 400, 800, 800+, 1000

GST Ex \$41 + GST \$4.10 (28179) GST INC **\$45.10**

We don't have double packs for the 900 or Photo 1270 cartridges only the black cartridge for the Stylus Photo 720.

Epson Model	480	720	760
Print Method	Piezoelectric	Piezoelectric	Piezoelectric
Print Speed Colour (econ mode)	2.6ppm	4.2ppm	6.8ppm
Print Speed Black (econ mode)	4ppm	4.3ppm	7ppm
Print Resolution	720x720	1440x720	1440x720
Paper holding capacity			
Plain 100 shts	100 sheets	100 sheets	100 sheets
Epson Transparency	1 sheet	30 sheets	20 sheets
Envelopes	10 env	10 env	10 env

Can on a Canon, Can Do!

A4 BJC- 3000



GST Ex \$222 +
GST \$22.20
(94499) GST INC

\$244.20

- Up to 9ppm print speed black
- 1440 dpi
- Separate replacement colours

A3/A4 BJC- 6500



GST Ex \$563 +
GST \$56.30
(95962) GST INC

\$619.30

LBP1000

10 pages per minute print engine at 1200 dpi resolution. Energy saving 'On-Demand' toner fusing. Cost-saving 'economy' printing mode. Powerful processor to ensure maximum throughput. Memory Saving

Technology to accomplish more in less RAM. PCL6 Print Language emulation. Optional genuine Adobe® PostScript® 3™ printer language. Optional second 250 sheet paper feeder. Maintenance free 'all-in-one' toner and drum cartridge. 4 MB RAM standard - upgradeable to 36 MB.



GST Ex \$1,053 + GST \$105.30

(95983) GST INC **\$1,158.30**

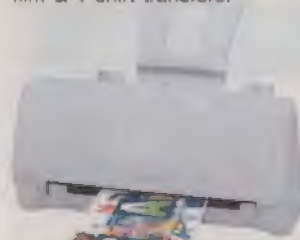
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BJC-1000SP

Super Economy Mode in black & white & colour. Vivid colours, on plain paper. Photo Mode colour, optional PhotoRealism. Auto image improvement. Print banners up to 6 A4 pages, envelopes, transparencies, glossy photo paper, high gloss film & T-shirt transfers.

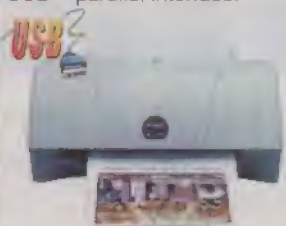


GST Ex \$122 + GST \$12.20
(A1792) GST INC

\$134.20

BJC-2100SP

High performance at a low price - the ultimate printer! Ultra compact design. Up to 5ppm in monochrome. Up to 2ppm in colour. 4-colour photo printing. Optional colour image scanning. Range of driver features. Banner printing. USB + parallel interface.



GST Ex \$160 + GST \$16.00
(A3173) GST INC

\$176.00

BJC-6200

Compact design and uncompromised performance! Up to 10ppm in monochrome. Up to 7ppm in colour. 1440 x 720 dpi. 6-colour photo printing. Sharper, blacker text. Optional colour image scanning. Separate colour ink cartridges! USB + parallel interface.



GST Ex \$325 + GST \$32.50
(A3507) GST INC

\$357.50

LBP800

Desktop laser, 8ppm, 300x300dpi, 600x600dpi and 2,400dpi with text and line smoothing. 512K buffer. 2,500 pages per cartridge (5% cover). Win® 95, 98 and NT 4.0.

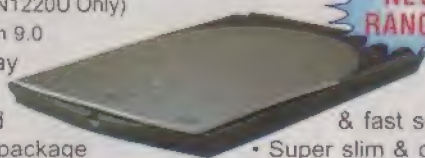


GST Ex \$468 + GST \$46.80
(83787) GST INC

\$514.80

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- Full Version 9.0
- Plug & Play
- Fully integrated software package



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- Silent & fast scanning
- Super slim & compact

N650U

600x1200dpi.
GST Ex \$190 +
GST \$19.00
(A3522) GST INC

\$209.00

N1220U

1200x2400dpi.
GST Ex \$244 +
GST \$24.40
(A3523) GST INC

\$268.40

FB-1210U

1200x2400dpi
GST Ex \$407 +
GST \$40.70
(A3524) GST INC

\$447.70

DIGITAL IXUS



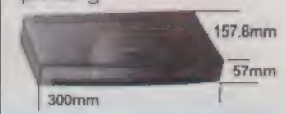
ixus is the worlds smallest digital camera with a zoom lens. 2.11 mega pixel with 8Mb flash card.

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(A3521) GST INC

\$1,248.50

BJC-85

- Mac & Windows Multi-interface USB
- Up to 5ppm in monochrome
- Cordless printing
- Up to 2ppm in colour
- 720x360dpi
- Optional 4-colour photo printing



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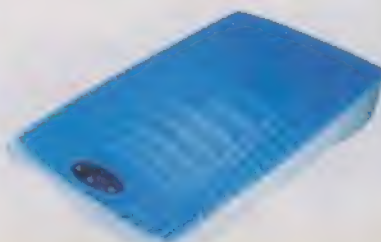
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HP ScanJet 3400C

Easy scanning, copying
and e-mail!

- WYSWYG capability
- Dual I/O: USB & Parallel interface
- 600 dpi optical
- 36 bit colour
- Precision Scan LTX software



GST Ex \$262 + GST \$26.20 (A2285)

GST INC **\$288.²⁰**

HP ScanJet 4300C

Scan/copy/e-mail
from a brand you can trust

- WYSWYG compatability
- Dual I/O: USB & Parallel
- 600 dpi optical - 36 bit colour
- Windows 2000 support
- Precision Scan LTX software
- Corel Print House 2000



GST Ex \$340 + GST \$34.00 (A2286)

GST INC **\$374.⁰⁰**

HP ScanJet 5370C

Multiformat - Scan/copy/
e-mail and fax

- 1200 dpi optical resolution
- 42 bit colour
- Active XPA included
- Negatives support
- Dual I/O: USB & Parallel
- Active transparency adapter
- Mac drivers
- Precision Scan Pro 2.5



GST Ex \$513 + GST \$51.30 (A2287)

GST INC **\$564.³⁰**

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sheets

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Photo Paper
A4, 15 sheets

(54010)
GST Ex \$15 +
\$1.50 GST

\$16.50

HP Premium
Photo Paper
A3, 20 Sheets

(58635) GST Ex
\$56 + \$5.60 GST

\$61.60

HP DeskJets

HP DeskJet 640C

HP's easy, everyday colour
inkjet printer

- Black and colour cartridges included - everything you need!
- Great results on plain paper
- Special projects made simple - greeting cards, envelopes & more
- Prints up to 6 ppm black and 3 ppm colour



GST Ex \$168 + GST \$16.80 (A2288)

GST INC **\$184.⁸⁰**

HP DeskJet 840C

HP's creative photo-quality
colour, speed and flexibility

- Photo-quality with HP PhotoREt II
- Alternative 600x1200 dpi mode on photo paper
- Prints up to 8 ppm black and 5 ppm colour
- Exclusive HP inks dry fast for smudge-resistant text and images



GST Ex \$291 + GST \$29.10 (A2289)

GST INC **\$320.¹⁰**

HP DeskJet 930C

Compact Photo- Quality
Colour InkJet Printer

- Alternative 2400x1200dpi mode on photo paper with HP PhotoREt 3
- Excellent results on all types of media in all modes
- Prints up to 9ppm black and 7.5ppm colour



GST Ex \$354 + GST \$35.40 (95761)

GST INC **\$389.⁴⁰**

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HP OfficeJets

HP OfficeJet T45

All Colour: Printer, Copier,
Scanner & Fax

- 600x600dpi InkJet Printer with HP PhotoRET II
- Up to 9ppm print speed (black) and 6.5ppm (colour)
- 75 speed dials, 55 page fax memory
- Up to 1200dpi enhanced (300dpi optical) scanning, 24bit colour.



GST Ex \$675 + GST \$67.50 (84356)

GST INC **\$742.50**

HP PSC500

All Colour: Printer, Copier
& Scanner

The PSC500 provides incredible printing, scanning and copying at a great price! 1200 dpi printing on photo paper. 9600dpi enhanced scanning, 30 bit colour.



GST Ex \$670 + GST \$67 (A2299)

GST INC **\$737.00**

HP OfficeJet G85

All Colour: Printer, Copier,
Scanner & Fax

The OfficeJet G85 not only provides incredible printing, scanning and copying but is also a fully featured colour standalone fax.



GST Ex \$1,290 + GST \$129.00 (A0062)

GST INC **\$1,419.00**

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- MS Pocket Internet Explorer
- MS Pocket Outlook
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- Built-in MP3 Player (stereo sound)
- Digital Image Viewer
- Compact Flash Slot for expansion
- USB & Serial Synchronisation
- Crystal Clear Colour Display

GST Ex \$996 + GST \$99.60 GST Inc **\$1,095.60**

(A5434)

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GST Ex \$1127 + GST \$112.70 GST Inc **\$1,239.70** (A0705)



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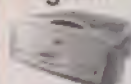
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GST Inc:
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T1200. (75582)
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GST Inc:
\$223.³⁰



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SCSI-2. 36 bit.
Transparency
scanning. Opt.
res. 600x1200ppi
(74498)
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+ GST: \$124.40
GST Inc:
\$1,368.⁴⁰



DuoScan T2500
SCSI-2. 36 bit.
Transparency
scanning. True opt.
res. 1250ppi
(74499)
GST Ex: \$7,995
+ GST: \$799.50
GST Inc:
\$8,794.⁵⁰



GST Ex: \$293 + GST: \$29.30
(99757) GST Inc: **\$322.³⁰**

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ePhoto CL18

Dual Mode: (point-and-shoot digital camera with video conferencing, video clipping and video e-mailing features), VGA (640 x 480 pixels) optical resolution with CMOS sensor, 32 images on internal 2Mb memory (non removable), Optical viewfinder, Built-in Flash, ISO 200, Includes camera cradle for video conferencing, USB interface. Excellent s/w bundle (Twain driver, Corel PrintHouse, Corel PhotoHouse, Microsoft NetMeeting, ArcSoft VideoImpression)



GST Ex: \$382 + GST: \$38.20
(99759) GST Inc: **\$420.²⁰**

SnapScan e50

1200 x 2400 optical resolution (9600 maximum), 42 Bit, USB interface, Integrated TPO for transparency and negative scanning, 4 front panel buttons (programmable), 3 interchangeable coloured handles and button covers. Agfa ScanWise and comprehensive software package including Corel Print Office 2000 and Readiris.

ePhoto CL30 Klik!

The fantastic ePhoto CL30 now available with built-in Iomega Klik! Drive. Mega-pixel digital camera with USB interface and a resolution of 1440x1080 pixels. Features an optical viewfinder and 1.8" colour LCD screen. Auto focus lens with 2x digital zoom and macro function.



GST Ex: \$989 + GST: \$98.90
(89409) GST Inc: **\$1,087.⁹⁰**



White
GST Ex: \$192 + GST: \$19.20
(74496) GST Inc: **\$211.²⁰**

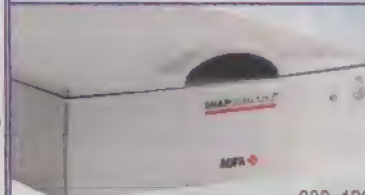
SnapScan 1212u

One pass, high quality 600x1200ppi scanner (9600ppi max.) with USB interface. Includes Caere OmniPage LE OCR, Caere PageKeeper, Corel Print-House Magic Select & Agfa's incredible ScanWise software. Mac and Win98/Win2000 compatible "Best Scanner 1999" - PC World magazine

SnapScan Touch

Agfa's revolutionary SnapScan Touch USB Scanner has four programmable buttons: scan direct to file, email, fax or printer. 600x 1200 ppi, 36 bit, landscape desktop scanner. Comes with 7 translucent coloured handles! Software: Agfa ScanWise, Caere OmniPage LE, Caere PageKeeper (PC only) Micro Frontier Color ITI (Mac only) and Corel Print House

GST Ex: \$208 + GST: \$20.80
(87209) GST Inc: **\$228.⁸⁰**



GST Ex: \$167 + GST: \$16.70
(74495) GST Inc: **\$183.⁷⁰**

SnapScan 1212p

One pass, high quality 600x1200ppi scanner (9600ppi max.) with parallel interface. Includes Caere OmniPage LE OCR, Caere PageKeeper, Corel Print-House Magic Select & Agfa's incredible ScanWise software. Compatible with Win95/98/NT. 36-Bit

SnapScan e40

1200x2400 optical resolution (9600 maximum), 42bit, USB interface, 3 interchangeable coloured handles. Agfa bundles Corel Print Office 2000 and Readiris. Corel Print Office makes it easy to create impressive documents and Web pages. Readiris, which recognizes 55 languages, lets users easily convert hard-copy documents — originals, faxes and photocopies — into editable text. All software provided is available in 5 languages, for both Windows (including Windows 2000) and Macintosh platforms.

GST Ex: \$344 + GST: \$34.40
(A5009) GST Inc: **\$378.⁴⁰**

* To claim your cash back simply visit the Agfa website at www.agfa.com.au for a redemption form. Attach the original barcode and a copy of your receipt to claim. Promotion closes 31st January 2001.

MYOB

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MYOB's market-leading small business solutions are dedicated to saving you time and making it simpler to manage Australia's GST and complete the Business Activity Statement (BAS).

MYOB FirstAccounts

GST Ex: \$159 + GST: \$15.90
(85770) GST Inc: **\$174.90**

The ideal first accounting system and GST solution for small service-based businesses. No business is too small for MYOB FirstAccounts. Features the innovative MYOB BASlink - which instantly creates a report providing all the GST information your business needs to complete and lodge the Business Activity Statement (BAS).

- Easy to set up & use
- Simple GST management
- Tracks income and expenditure
- Completely customisable forms: invoices, statements, cheques, etc

Compatible with Win 95/98 or later, NT 4.0 or later, Mac OS 8.0 or later.

New Version!
includes bonus
BAS video



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MYOB Accounting

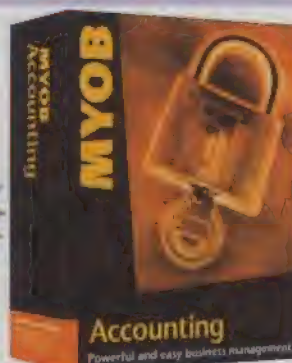
GST Ex: \$319 + GST: \$31.90
(85771) GST Inc: **\$350.90**

The simple to use, single-user solution with enhanced GST management for both service and inventory based businesses with around 1-10 employees. Features include:

- Easy to use, award winning design
- MYOB BASlink
- Powerful inventory, job costing, general ledger, reporting & more
- Includes OfficeLink - the dynamic link to Microsoft Office
- BAS & GST READY

Compatible with Win 95/98 or later, NT 4.0 or later, Mac OS 8.0 or later. *conditions apply

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MYOB Accounting Plus

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(85772) GST Inc: **\$499.40**

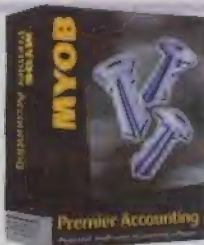
Suited to both service and inventory based businesses with 1-30 employees, MYOB Accounting Plus maintains MYOB Accounting's ease-of-use and extends the functionality to include:

- Fully integrated payroll
- Professional time billing module
- Includes OfficeLink
- BAS & GST READY

The fully integrated payroll feature automatically updates all related accounts the instant a pay is entered - with no tedious importing or exporting of data required.

Compatible with Win 95/98 or later, NT 4.0 or later, Mac OS 8.0 or later. *conditions apply

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MYOB Premier Accounting

GST Ex: \$863 + GST: \$86.30
(85773) GST Inc: **\$949.30**

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- Effortlessly handles multiple currencies

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*Conditions of the 'Buy now and get the next upgrade free' offer: Applies only to MYOB Accounting, MYOB Accounting Plus and MYOB Premier Accounting purchased after 1st September 2000. Software must be registered. On release, the upgrade will be automatically dispatched directly to the registered owner.

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Quicken: Personal Plus

The easiest way to organise your personal investments!

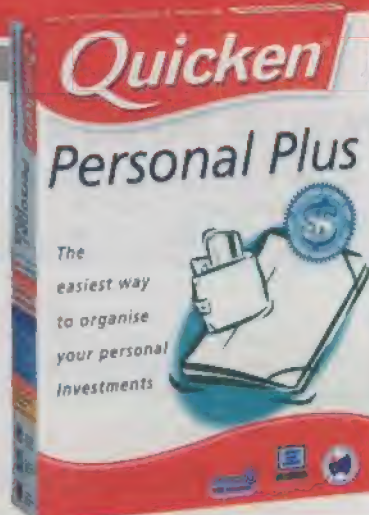
Personal Plus gives you an accurate snapshot of your financial health at anytime. As well as monitoring your bank accounts, savings and investments it also tracks credit cards, mortgages, loans and superannuation. With Personal Plus you can actively monitor your share portfolio and update the value of your portfolio via the Internet**. Personal Plus will even alert you when your preset stock price is reached! Other features include the ability to:

- Track GST - for personal transactions only
- Keep tax records automatically
- Easily convert files for use by your accountant
- Handle multiple currencies
- Oversee budgets and forecast future account balances
- Automate recurring transactions e.g. direct debits
- Download bank statements direct from internet banking sites***
- Alert you when your bank balance falls to a preset level
- Plan home and contents insurance
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GST Ex: \$99 + GST: \$9.90

(A1774) GST Inc:

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Quicken: CashBook

CashBook is a single entry cash accounting package for small businesses. Whether you've just started a business or outgrown manual bookkeeping, this package will easily manage your business finances.

CashBook features include:

- Producing quotes, work orders and invoices
- Storing customer and supplier records
- Managing work in progress and updating job records
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- GST management for tracking inputs and outputs for the relevant tax codes (except Wine Equalisation Tax)
- Producing the information needed for Business Activity Statements
- Tracking bank balances and printing cheques
- Up to 79 different financial reports and graphs

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(A1775) GST Inc:

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QuickBooks: Make the GST & BAS easier!

Easier accounting software for small to medium businesses!

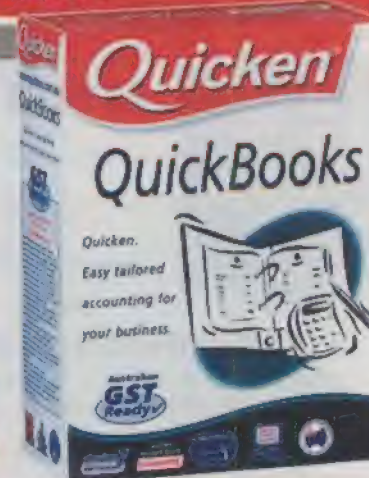
Designed for small to medium businesses. Handles inventory and double entry Accounting. Keeps track of bank balances, loans and other finances. Calculates charges on overdue payments, monitors unpaid bills, writes and prints cheques, records stock and offers 79 different financial graphs and reports. QuickBooks is GST Guaranteed.

- Manages small business finance
- Invoicing and debt management for small business
- Insights into finance
- Accounts receivable / debtors tracking
- Accounts payable / creditors tracking
- Inventory and purchase order control
- Customisable invoices and statements
- Cheque preparation and printing

GST Ex: \$173 + GST: \$17.30

(94375) GST Inc:

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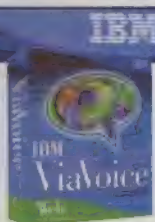


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Diskeeper V5.03 Server

GST Ex \$489 + GST \$48.90 (82944) GST Inc: **\$537.90**

Diskeeper V5.03 Workstation

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Accidentally deleted files are a fact of computing life. When accidentally deleted files are not in the Recycle Bin, it makes lots of extra work for system administrators. The usual solution is to search through backup tapes until they find the lost file. This often consumes hours. Most businesses run backup at night, so work done after the latest backup is often lost and needs to be recreated.

More wasted time and lost productivity. Undelete is a complete solution for Windows NT Servers and Workstations giving a Network Administrator the ability to instantly restore deleted files. As you will see, Executive Software Undelete provides a complete, real world solution to these every day problems.

Undelete V2.0 Server (pic)

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Undelete V2.0 Workstation

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Professional Web Development



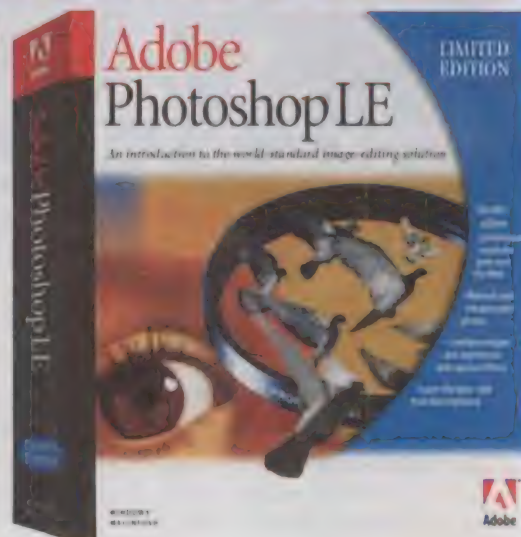
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(97357) GST INC: **\$215.⁻⁶⁰**



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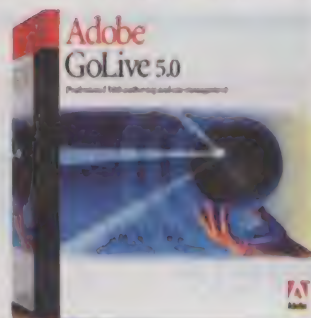


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GST Ex: \$537 + GST: \$53.70
(99749) GST INC: **\$590.⁻⁷⁰**

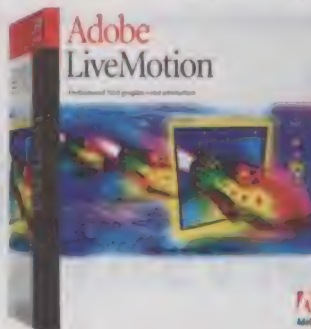


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Adobe Take your Web sites to a whole new level with Adobe® LiveMotion™.

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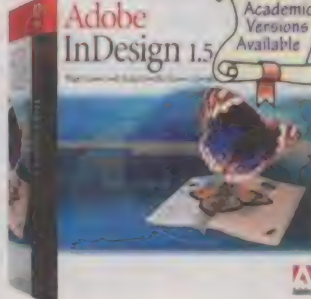


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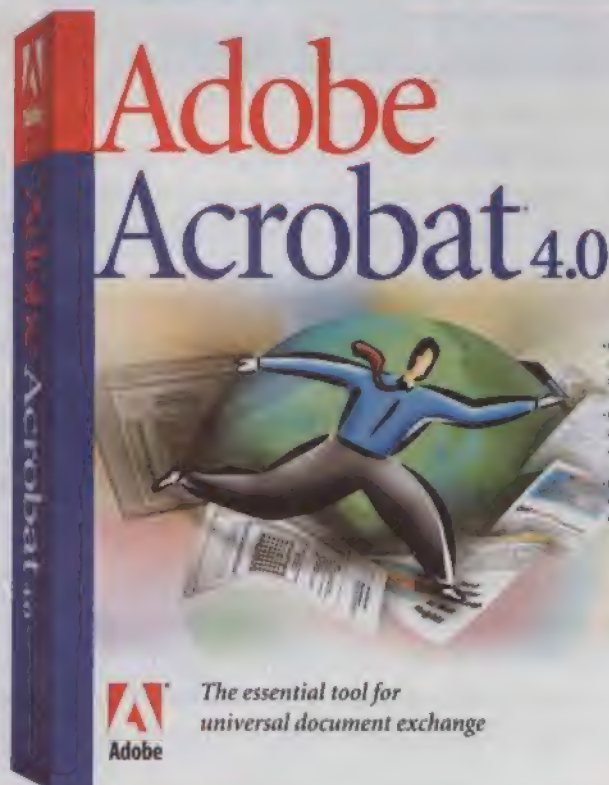
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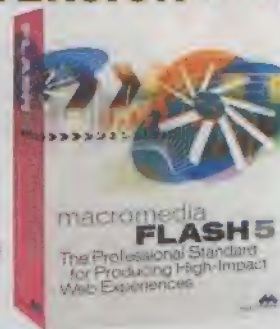
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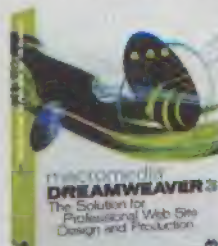


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Build cross-browser Web sites and maintain complete control over HTML. Maximise productivity and streamline workflow between team members and between applications such as Fireworks, Director, Flash and Microsoft Word. And, because you extend Dreamweaver to integrate with other Web applications, complicated programming can be achieved in a few simple steps.

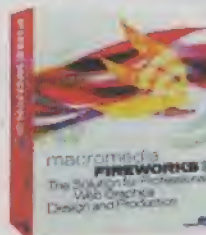


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Fireworks 3 creates fully editable Web graphics in an instant. Enhanced features, such as the History Palette and the Symbols Library, and seamless integration with popular HTML editors and graphics tools save hours of production time. And, since everything is JavaScriptable, you can automate repetitive tasks to meet the demands of constant edits.



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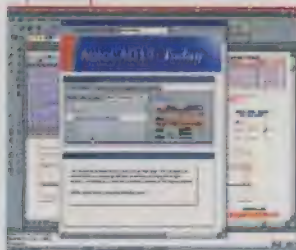
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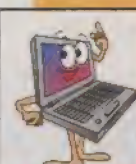


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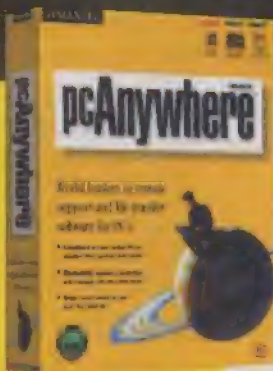
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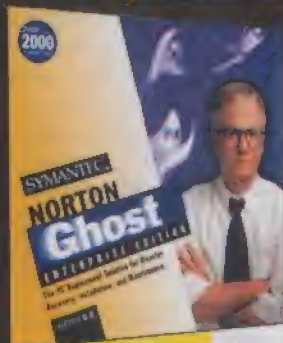
Norton AntiVirus

Norton AntiVirus (NAV) Desktop and Server 4.0 provides fast, reliable and hands-free company wide virus protection. The unique NAVEX Engine exclusively enables you to add new components to your NAV engine without having to redeploy the whole software. The Centralised Management Console enables you to completely manage your organisations security from one machine all in real time. With the unique Live Update feature you can automatically schedule updates of virus patterns and product updates.



pcAnywhere

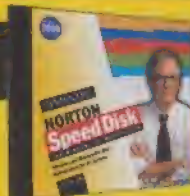
Essential for providing connectivity for remote and mobile users. This proven, secure comprehensive solution lets you connect to any computer anywhere and operate it as if you were there. Mobile and remote employees can quickly and easily access office-based files and applications. PcAnywhere is also the #1 choice of IT professionals worldwide for remote troubleshooting and helpdesk support. Helpdesk personnel can more quickly identify, secure and resolve user problems, without traveling to the remote machine.



Norton Ghost

Norton Ghost 6.00 is the premier tool for PC recovery, deployment, cloning, and migration. Now administrators can restore a system image onto a failed PC in as little as seven minutes, and reduce PC deployment and upgrade times by 90 percent or more. It dramatically reduces IT costs by streamlining the configuration of networked workstations.

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About Symantec: Symantec, a world leader in Internet security technology, provides a broad range of content and network security solutions to individuals and companies. The company is a leading provider of virus protection, risk management, Internet content and e-mail filtering, and mobile code detection technologies to enterprise customers.

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Symantec pcAnywhere 9.2 & Norton AntiVirus 2000



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Provides home/mobile user with instant access to office computer/network • Allows user to remotely control your office PC over the Internet • Win 3.1/95/NT, DOS. Transfers & synchronises files between 2 computers. Drag and drop to transfer files from PC to PC/network. Plug & Play; help wizards in multiple compressed layers. Prompts you to run LiveUpdate when your virus definitions are out of date.

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Norton Personal Firewall gives you peace of mind that your PC is secure from intrusion by hackers and your privacy is protected. Norton Personal Firewall gives you the strong and easy to use firewall plus privacy protection features that protect your personal information from unauthorized access. Your maximum defense against hackers.

Norton Internet Security 2000 V2.0



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Norton Internet Security 2000 V2.0 is an integrated suite containing Norton Antivirus 2000, Norton Personal Firewall 2000 & Norton Privacy Control. Norton Internet Security 2000 gives you peace of mind that your PC is secure from intrusion by hackers and your privacy is protected. Norton Internet Security provides an integrated solution • protecting you from major internet threats in one suite. Total protection for home PC users.

Norton AntiVirus 2000

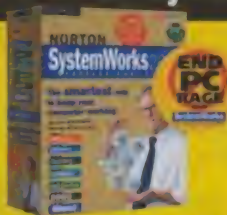


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Makes downloading files off the Internet safer than ever before • Monitors your systems in the background to prevent virus entry • Easy automatic online updates. Clear, easy to understand instructions on how to proceed when a virus is detected. Choose the folders or directories to scan. Scans incoming email attachments automatically. Eliminates viruses hidden in multiple compressed layers. Prompts you to run LiveUpdate when your virus definitions are out of date.

Norton SystemWorks Pro



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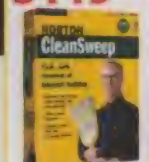
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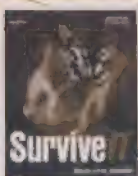
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Survive IT 4.5 Advanced Edition Windows NT

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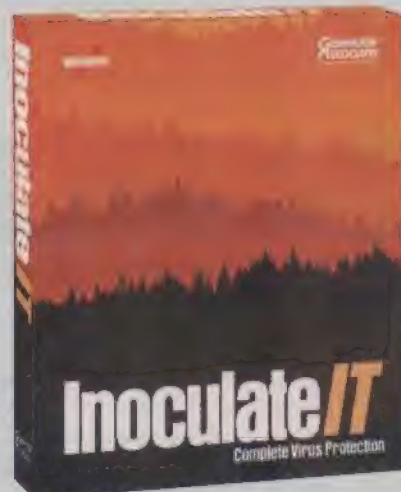
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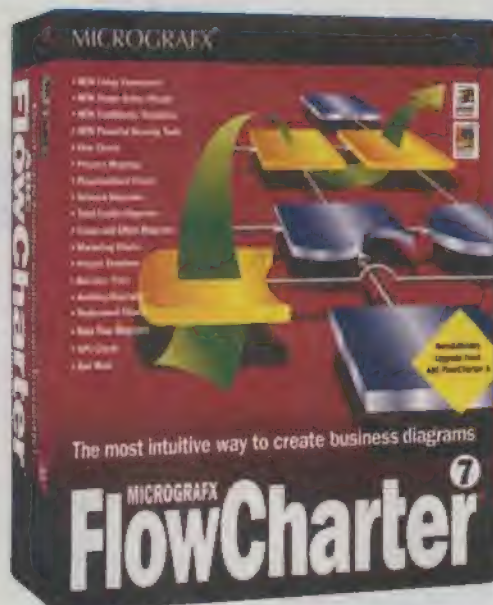


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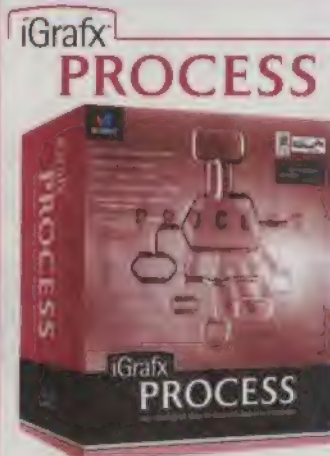
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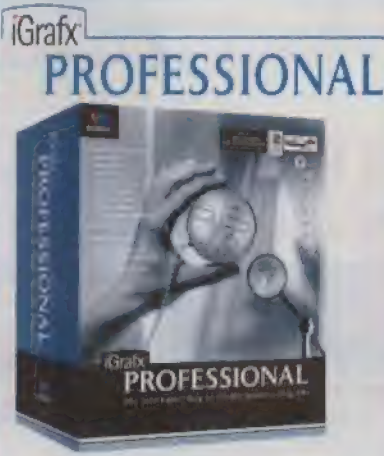


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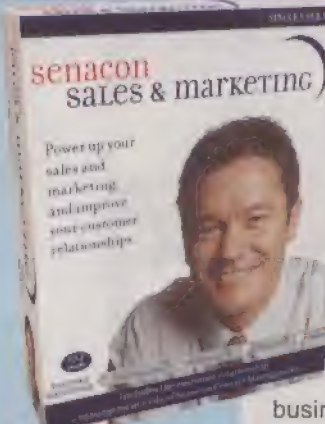
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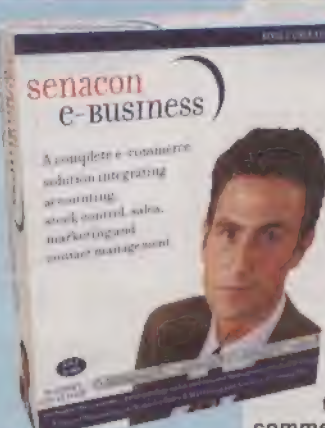
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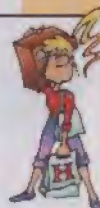
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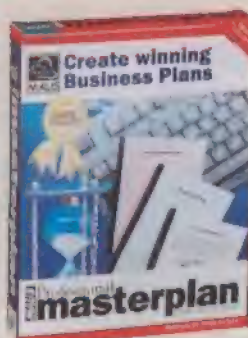
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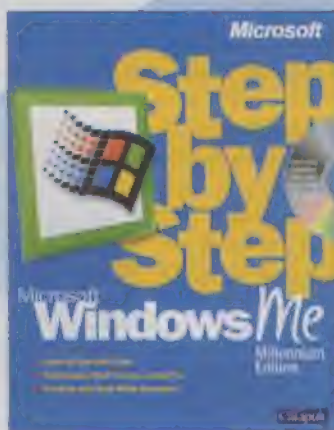
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Microsoft Windows Millennium Edition, the newest version of the Microsoft Windows operating system for home PCs, offers the richest Internet and entertainment experience by simplifying the use of key PC features that people work and play with every day. DO IT YOURSELF MICROSOFT WINDOWS MILLENNIUM EDITION is the quick, easy way to find what you need to know so you can get on with what you're doing with Windows Millennium Edition. Written in a light, friendly voice, this book showcases the many cool new add-ons in Windows Millennium Edition, such as the Pictures Acquisitions Wizard, which makes it easier to work with photos from your digital camera or scanner; a simple utility for networking multiple PCs and peripherals such as your printer; direct voice play so you can talk to other players during head-to-head combat over the Internet; plus many other Internet, video, and audio features. The book features straightforward step-by-step procedures and tips and tricks to help you get the most out of Windows Millennium Edition right away. The author's close working relationship with the Windows Millennium Edition software product team lets him deliver the latest insider insights about Windows Millennium Edition, making this the definitive condensed resource for information about the new operating system.



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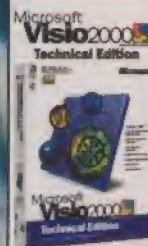
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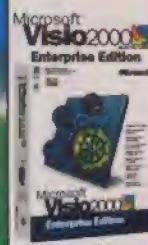
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In the blood

Vampire: The Masquerade — Redemption

In this game, which was originally a paper-based RPG, you play Christof Romuald, a mortal man living in the Dark Ages. You are a Crusader of the Order of the Swordbrethren. Wounded, you are left in a Prague convent to convalesce. You begin the game by performing a few tasks — for example, protecting the streets of Prague at night, or slaughtering monsters. It's only when you slay a minor vampire that the night brethren notice and attack you, thereby making you one of them.

This game has made a successful transition to the computer. One of the central themes is the struggle to retain your humanity. You are a vampire, but you must control your bloodlust to prevent the vampire in you from taking over and turning you into nothing but a monster. Once you lose to the monster inside, your character is dead. The tension between being a creature of the night and trying to retain your humanity is what makes the game so appealing and fun to play.

You are a member of the Brujah clan, the more tempered and learned of the 13 vampire clans. The Brujah clan has claimed you before some of the more powerful, less humane vampire clans were able to. Thus begins your adventure, which spans centuries from medieval Prague to contemporary London.

The game gets right into the role-playing and combat side of things. This sets Vampire apart from other gaming conversions, such as Dungeons and Dragons, and Advanced Dungeons and Dragons. These

games never lost their reliance on dice rolling, and this was most apparent during combat. Statistics do play a large part in Vampire, but these are hidden in the background, allowing the game to flow smoothly. Role-playing works partly through dialog path choices made during cut scenes, which help define your character. Much of the role-playing in the game consists of watching Christof during the cut scenes, which means that the rest of the game is combat-based.

This is where Vampire has a problem. With the role-playing out of the way, the rest of the game relies heavily on combat, and this becomes a little tedious. Coupled with the fact that every dungeon, lair or crypt is exactly three levels deep, this gives Vampire a Diablo-like repetitiveness. The crypts, lairs and dungeons are laid out in a linear format, with clearly defined progress paths, which also takes some mystery out of the game.

Combat in Vampire is point and click, but some of the fights can become quite frenetic, especially when you have a full complement of vampires in your party.

You have to monitor your health and bloodlust as you play the game. Your party needs blood to survive, which you get by attacking people, rats, monsters and other vampires. In this game, vampires do not need to kill to feed, and can drink from victims without turning them into vampires.

You also need to monitor your frenzy level, as this can determine how close you are to losing your humanity. A hit from an

Blood-sucking vampires fight to hang on to their humanity.



enemy can make your frenzy levels jump, and sometimes it isn't easy to get out of a fight.

Graphically, Vampire is a great-looking game. It is a third-person game, much like Tomb Raider, and you can either have the camera track Christof automatically (or whichever of your party members you choose as leader), or you can use the mouse to swing the camera around the action. The graphics are gorgeous, with realistic textures and smooth animation. The cut scenes are moody, but a little melodramatic.

With more focus on exploration and less on combat, Vampire could have been a much better game than it is. Nevertheless, it's an enjoyable game and well worth its price tag.

Darren Ellis



Contact Activision

Phone (02) 9869 0955

Online www.harveynorman.com

Price \$89.95

Requires Pentium 233, Windows 95, 64M

RAM

Classification M(15+)

Rating ■■■■■■■■



Diablo II

Diablo was a groundbreaking game that sold over a million copies. As well as bringing role-playing games (RPGs) to the masses, it brought new levels of enjoyment in gaming to many people. Diablo saw gamers venturing into the depths of hell and battling evil minions such as zombies, skeletons and demons. In Diablo II, the same evil has reared its ugly head once more.

After defeating the Lord of Terror, Diablo, our original hero, returns to Tristram to celebrate. However, he is unable to contain the immense evil which dwells inside him. Travelling east in search of his brothers Mephisto and Baal, Diablo leaves terror and evil in his wake.

It is your job to stop Diablo and destroy the minions that he has left behind. To do so, you must choose one of five characters. The Barbarian is a muscle-bound close-combat warrior who wields two swords simultaneously. The Sorceress has no hand-to-hand combat skills — she is a master of magic. The Paladin is a holy warrior who specialises in sword combat, and he also possesses a variety of magical skills. The Amazon is a specialist with the bow and arrow, and has limited close-combat and magical skills. The Necromancer can raise enemies from the dead and animate objects. This impressive array of characters is one of Diablo II's greatest strengths, and it means you can replay the game many times without monotony.



The interface used to control your character is almost identical to its predecessor, so those who played Diablo will feel right at home. The original point-and-click combat system has also been retained. Many will find this system too simple, but the number of spells and powers to be gained later in the game might counteract that.

In keeping with the similar interface, Blizzard has also opted to keep Diablo's maximum in-game resolution of 640 by 480. This is very disappointing, especially considering the use of 800 by 600 and 1,024 by 768 resolutions in most similar games. The 640 by 480 resolution leads to some pixelation, and the Direct 3D option provides little improvement.

However, the quality of the graphics is not what draws people to the Diablo series. It's the monsters to battle, spells to cast and terrains to conquer that draw the crowds — and in all these areas Diablo II delivers superbly.

The game boasts over 200 different monsters, ranging from standard fare such as zombies, spiders, ghouls and demons to more exotic creatures such as lake monsters and a giant slug. This diversity of enemies ensures that you are always slightly fearful of what lurks in the dark when exploring the environment of Diablo II.

Spell-casting has also been markedly improved. The Sorceress and Necromancer can build an impressive array of magical skills, and the Paladin can acquire both offensive and defensive 'auras'. For many gamers, magic is the most important element in an RPG, and with over 100 different spells and special abilities on offer, you should be satisfied.

Multiplayer gaming is conducted on



Blizzard's Battle.Net servers. Despite some earlier problems, Blizzard has almost completely removed the lag and cut-out issues, ensuring smooth gameplay for all.

Questing online brings a great sense of satisfaction, and with tens of thousands of gamers playing simultaneously, you can be sure that there will always be people online to play with.

Despite its graphical and combat shortcomings, Diablo II is a superbly polished game. Blizzard has expanded almost every area of the original Diablo, increasing the size of each Act and the number of monsters, spells and objects. Diablo II is hugely addictive and incredible fun to play. Hell beckons once again.

Alan Crawford

Contact Jack Of All Games
Phone (02) 9482 7920
Online www.blizzard.com/diablo2
Price \$99.95
Requires Pentium 233, 32M RAM
Classification MA(15+)
Rating ■■■■■■■■

Dark Reign 2

Dark Reign first appeared while the relatively new real time strategy (RTS) genre was still hot. Command and Conquer brought the genre into being, and games such as Total Annihilation and Dark Reign sought to push it in new directions.

Dark Reign 2 is no different, aiming to create a new breed of RTS involving a 3D-accelerated world where the player is free to hover above the action, moving the point of view as close or as far away as strategy demands. We've seen similar styles of gameplay from Myst and the recently released Shogun, but currently Dark Reign 2 is the only one that concentrates on the popular build-and-conquer gameplay that's particular to RTS games.

Does Dark Reign 2 capture the frantic, absorbing, strategic gameplay of RTS? Yes indeed, and it introduces a host

of new gameplay styles as well. One problem commanders often have to deal with in RTS games is the perimeter defence of a base, and Dark Reign 2 makes this easy by allowing energy fields to be stretched between gun towers. This doesn't make bases impenetrable, of course, because the towers are the weak links. Destroy a tower while attacking a base and you can bring down two or more fields. Environmental effects such as weather and day/night changes play a part as well — some of the power sources are solar, so this can make for some very interesting dynamics.

The two sides of the conflict — the Jovian Detention Authority (a group in charge of shipping bad people off to the penal planet Io) and the Sprawlers (the mutated remnants of human life) — control a variety of different buildings and units, but the two groups are, essentially, balanced. Tanks, troops and powerful weapons all play their part.

Dark Reign 2 succeeds in taking the genre to a new level. If you're after a new RTS game, then Dark Reign 2 is a good choice.

Ashton Mills



Contact Activision
Phone (02) 9869 0955
Online www.activision.com/games/dr2
Price \$89.95
Requires Pentium II 300, 64M RAM, 3D Accelerator
Classification M
Rating ■■■■■■■■

Music 2000

Music 2000 is one of several new programs that are half game and half musical tool. For instant gratification, you can load up one of the demo tunes and start remixing it in a matter of seconds. You can also start up a network jam and a few friends can join in. Alternatively, you can use all your own sounds and write a song with no presets or demo sounds at all.

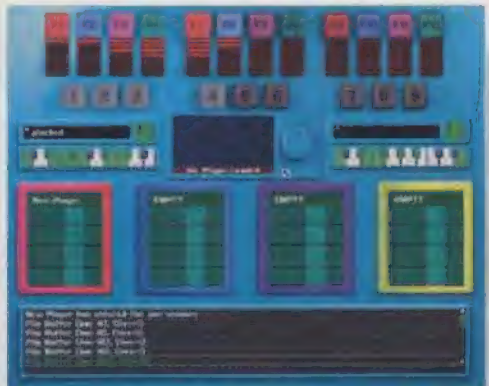
The degree of control you have in Music 2000 is surprising. There are envelope generators for each sample, and nine different filter effects. You can record audio straight into a sample channel as well. There is a video channel for your songs that allows you to insert videoclips

and effects, either from the Music 2000 CD or from your own collection. If building a videoclip from scratch seems like a bore, you can 'auto-generate' one instantly.

Overall, the versatility of Music 2000 is impressive, although it didn't work either as a game or as a musical tool completely successfully. The interface was too clunky and required too many mouseclicks to perform even basic tasks. Simple things like editing notes in a riff were laborious, and even changing the BPM of a song was frustrating and not intuitive.

It took quite a lot of perseverance to actually compose a tune and generate a simple video — which you cannot export to AVI. While the feature set is reasonably good, the developers will need to rethink the design before it becomes user friendly. The live jamming concept is awesome, and this is probably the area where Music 2000 has the most potential, but it would be better if the program were either a game or a sequencer, not a half-hearted attempt at both.

Daniel Potts



Contact OziSoft
Phone (02) 9666 0100
Online www.codemasters.com/previews/m2k-pc
Price \$87.68
Requires Pentium II 266, Windows 95, 32M RAM
Classification G
Rating ■■■■■■■■

Daikatana

John Romero and his team at Ion Storm have hailed *Daikatana* as the greatest first person shooter (FPS) ever. I beg to differ — perhaps if it had been released three years ago, it would have been one of the best, but in 2000, it's average.

It's very easy to find fault with *Daikatana*, as there are many problems and bugs. One showstopping bug prevents you from completing the game at all (a patch is coming soon, or you can download a working savegame at the appropriate juncture), but the other bugs are also annoying.

Daikatana has a story instead of the usual Doom-esque plot device. The daikatana, a magical sword which allows its wielder to travel through time, is missing.

Contact Ozisoft

Phone (02) 9666 0100

Online www.harveynorman.com

Price \$87.65

Requires Pentium II 300, 64M RAM, Windows 95

Classification MA(15+)

Rating ■■■■■■■■

Kage Mishima, the villain of the game, is going back through time and changing history to set himself up as a supreme ruler. You and your two sidekicks, Superfly and Mikiko, have the job of getting the daikatana back and restoring history.

The sidekicks can be very annoying — the artificial intelligence is nowhere near as smooth as it could be, so expect to see them running into door frames repeatedly or jumping on the spot. When they work, they supply extra firepower when needed. You need to take care of them, because if one dies, the game's over.

The four time periods you travel through have specific weapons and monsters. You start each period with just a base weapon, which makes *Daikatana* almost four FPS games in one. The level designs in each time period are excellent. Some of the levels are very short and linear, and others are a combination of levels. The only downside to the levels is the long, long load times.

Darren Ellis



Shogun: Total War

Shogun: Total War is a classic real time strategy and battle game set in feudal Japan. Daimyos compete for control of the land, but only one can become Shogun and eventually rule Japan.

As battle commander, you must defeat the enemy and become the Shogun. The game contains detailed references to Sun Tzu's classic text 'The Art of War', and you can apply strategies from this text to the battles you are fighting.

There are three modes of play in *Shogun: Total War*. The first is campaign play, where you use land, soldier and social management skills, as well as battle skills. The second is historical battles, where you can re-enact or change the outcomes of some of the famous battles of

the era. In the third mode, you can construct your own campaigns and battles. You can also battle other up-and-coming Daimyos on the Net.

The battle screen is one of the game's main screens. Here you can have the troops lined up on the field and ready for combat in nicely rendered 3D.

You can control the action as it unfolds from this perspective (which also includes

a small top-down map of the area) or you can swing the camera around to see what the opposition is up to. Depending on how good your machine is, you can vary the number of men displayed onscreen — you can theoretically have thousands of men rendered at once.

Shogun: Total War is an excellent game that looks good and plays well.

Darren Ellis

Contact Electronic Arts

Phone (02) 9955 7744

Online www.totalwar.com/

Price \$98.96

Requires Pentium 233, Windows 95, 32M RAM

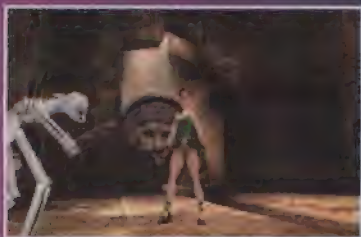
Classification M(15+)

Rating ■■■■■■■■



Gamespy

● Good news for Star Wars fans: along with Verant and Sony Online's forthcoming online Star Wars RPG, Baldur's Gate producers BioWare and Lucas Arts have announced that they are working on a Star Wars-themed, single-player RPG. The game will be set about 1,000 years before Episode 1, when the Jedi were dominant and facing the emerging Sith. It's expected to be ready in 2002.



● Milking its franchise for all it's worth, Eidos has announced that a new Lara Croft title will be available soon, Tomb Raider Chronicles. The fifth instalment will be released on PC, Dreamcast and PlayStation/PlayStation2 late this year.

● Dynamix, a division of Sierra Online, has suffered a setback in the development of the anticipated Tribes 2. Its two lead programmers, Rick Overman (project director) and Tim Gift (technical director), have left the company to form their own startup development house, Garage Games. Losing two major figures when your game is only at alpha stage is no big deal, according to Sierra spokespeople, who still expect the game to be released later this year.

● How many copies of Daikatana need to sell before the expenses Eidos have outlaid in supporting 'visionary' John Romero are recouped? By July, US sales were a paltry 8,000-odd units, which is a fair way off Romero's prediction of over 2.5 million.

● Pandemic Studios, US developer of Dark Reign 2, has set up a development arm in Queensland in partnership with Auran (developers of the original Dark Reign). Andrew Payne, an ex-Auran staffer who left to work with Pandemic, has returned to Australia along with DR2 director Greg Borrud. Pandemic's next feature is expected to be a multiplayer online RPG, but the subject matter is still to be revealed.

Stephen King's F13

Stephen King has often joked in his book introductions that he could publish his laundry list and people would buy it. He seems to be testing this theory with F13. If you are a big fan of King and must own everything the man has written, here's another title for your collection. However, if you like a bit of substance with your software, move on.

The biggest bonus with this software is a previously unpublished short story by King called 'Everything's Eventual', about a young man called Dink Brayshaw who has certain talents. One day Dink gets a job offer he can't refuse. Rounding out the short story is a collection of time-wasting 'games' (things like 'whack-a-mole', but with skeletons), barely



animated screensavers, backgrounds, system sounds and a trivia game.

It's well put together, but nothing more than a short story and a collection of games and screensavers. APC kept turning back to the main menu to see if we'd missed anything. Five minutes in, we'd managed to explore the whole CD.

Darren Ellis

Contact Playcorp

Phone (03) 9329 2999

Online www.ea.com

Price \$43.95

Requires Pentium 166, 32M, Windows 95 or Mac OS 7.5, 32M RAM

Classification MA(15+)

Rating ■■■■■■■■

Microsoft Flight Simulator 2000 Professional Edition

Microsoft's latest addition to its Flight Simulator line, Flight Simulator 2000, is a hefty beast with high installation requirements. Unless you've got a very powerful system, it's probably not a good choice. The level of detail is spectacular, although on our test system we had to sacrifice some of the graphics detail to maintain a decent frame rate.

Flight simulators that don't contain a combat element are often a mystery to new users, who can't see the appeal of flying commercial planes and often get lost in the level of detail. Flight Simulator 2000 has a well-thought-out tutorial system to take new pilots through their paces.



As with most simulators, you'll only get the best out of Flight Simulator with the right controls and a lot of patience. Trying to play with a Sidewinder Game Pad, for example, revealed how badly digital controls handle this sort of thing (and how bad a pilot I am).

However, using a joystick, I could land my chosen plane almost every time. Sometimes, it was even the right way up. Flight Simulator 2000 is highly recommended for flight nuts, and even casual pilots might want to give it a try.

Alex Kidman

Contact Microsoft

Phone 13 20 58

Online www.microsoft.com/games/fs2000/default.asp

Price \$151

Requires Pentium 166, 32M RAM

Classification G(8+)

Rating ■■■■■■■■

DVDazzlers



DVD drives are almost standard on new PCs, but DVD players are still rare in the lounge room. This is likely to change in the next 12 months with an explosion of DVD titles and players onto the market. **Alex Kidman** takes a look at some of the new players.

Playing DVDs on your TV rather than your computer has many advantages. Screen size is usually bigger, sound setup is usually better. It's also a lot more comfortable to crash on the sofa, packet of potato chips in hand, than to sit in front of your 15in monitor waiting for the software decoder to catch up with the audio track.

In this roundup, APC tested five DVD players. We planned to test them only for picture and audio accuracy, but because they are consumer devices, we decided to consider a range of other questions as well. Will it look good with my existing setup? Does it look classy and shiny, or cheap and nasty? Does the remote work well and will I be able to use it instinctively, or will I have to aim with pinpoint accuracy and hunt down the pause button each and every time?

To test the DVD players, we used the Sony Wega ES34, an 84cm high-definition televi-

sion set. There were almost hernias all round from lugging the thing into the office, but that was quickly forgotten when we plugged it in. The Wega is very, very nice, but it will set you back \$4,499, so start saving your pennies now. All DVD players were tested using the cables that were supplied with them. If you're serious about your sound and picture quality, you'll probably want to upgrade to component level video and audio. All but one of the players we looked at only supplied reasonably basic RCA audio and video cables. The exception was the Sony, which came with an S-Video cable.

Testing DVD players requires watching lots of movies. Reviewing products can be very taxing, but somehow there seemed to be no shortage of volunteers willing to sacrifice precious work time in this case. Playback was checked for artefacts (rectangular blotches of colour) or other evidence of poor

quality. We tested using *Blade*, *Starship Troopers*, *Ghost in the Shell*, *Doctor Who: The Five Doctors* and finally, the action game *Dragon's Lair II: TimeWarp*. The first two titles were used to check the playback quality in detail-heavy, fast-moving scenes (as you'd get in most action titles). The animated *Ghost in the Shell* was used to check for defects in large areas of colour. *Doctor Who* was used to show up defects from a less-than-perfect video and audio source, while *Dragon's Lair II: TimeWarp* was used to test track searching, as it constantly alters the playback track during gameplay. (For more on *Dragon's Lair*, see our review on page 208.)

One conclusion we reached applies to all the products reviewed: DVD playback on a PC is fine, but on a decent player and a massive screen it's just about perfect. If anyone wants us, we'll be busy for a while...

Denon DVD-1500

The Denon DVD-1500 has the appearance of a top-notch piece of hardware with its stark, gold-tinted front panel. For the most part it delivers on this promise, offering excellent playback capabilities, a range of output options and a remote control that is well laid out. However, it is let down by the generally poor response of the remote control.

The Denon's playback was exceptionally good, even when using the basic RCA cables provided. The unit supports all the

component, S-Video and optical/coaxial audio outputs that you could want. It's not easy to spot noticeable differences between DVD playback on properly mastered titles, but even on titles that were less well mastered (especially *Doctor Who*), playback was still smooth and bright. Track selection was the best we saw — *Dragon's Lair* played through smoothly with almost no pausing.

The remote control has an acceptable layout and a good selection button setup.

However, the play, pause and stop buttons are a little small and the placement of the battery compartment makes the unit tip forward in your hand, which is irksome. More importantly, the responsiveness of the remote, and the system in general, was poor. The remote's small beam means you've got to point very

accurately to get any response. This was most noticeable when playing *Dragon's Lair*, where constant use of the remote is required, but it would also be annoying for regular DVD playback.

If the remote hadn't performed so badly, the DVD-1500 would easily have scooped the pool.



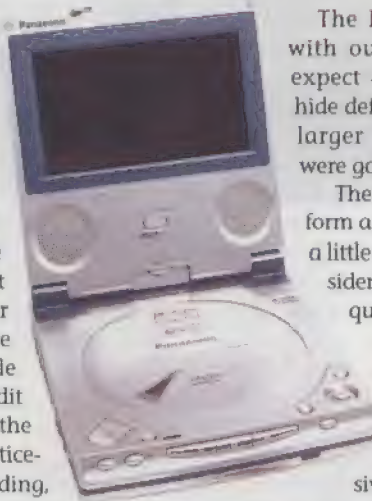
- Pros** Crisp, clear playback
- Excellent track searching
- Looks great
- Cons** Terrible remote detection

Contact Campsie HiFi
Phone (02) 9750 4000
Online www.denon.com
Price \$999

Panasonic DVD-L50

For pure style, it's hard to go past the Panasonic DVD-L50. This was APC's opinion when we got our hands on one of these little beauties a year ago. It's still a great gadget, but it's still got a killer price tag.

The L50 is a portable DVD player with its own screen in the top half of a clamshell design. It supports video out, and in our tests looked just as good on the big screen as it did on its little screen. It even has its own credit card-sized remote. The L50 is the Mini-Me of the A50. The only noticeable omission is 5.1 audio decoding, but as the L50 is designed to be a portable player, this is understandable.



The L50 performed well with our test titles. You'd expect a smaller screen to hide defects, but even on the larger screen the images were good.

The speakers didn't perform as well. The sound was a little tinny, especially considering the general high quality of DVD sound.

APC has two reservations about the L50. First, there's the price — at \$3,011, it's expensive. The second is the battery life. It has an estimated three-hour life once it's charged. This

accounts for two short movies, or one regular length one. As this product is designed for portable use, this is disappointing. It's still a great gadget and heaps of fun, but you have to spend a lot of time running it from the mains.

Pros Portable
Good screen incorporated
Cons Short battery life
Average speakers

Contact Panasonic
Online www.panasonic.com.au
Phone (02) 9986 7400
Price \$3,011

Pioneer DV-525

Pioneer claims that it's almost impossible to get a poor picture out of the DV-525, due to its advanced decoding process and level adjustment features. Its twin laser array also allows it to play back most CD-Rs.

Our testing certainly backed this up. Playback of action scenes was smooth, with no discernable faults, and colour sections in our animated title were rich and consistent. However, in the playback of Dragon's Lair, where major differences between players were revealed, the DV-525 didn't perform well. It was let down by definite pauses between scenes.

This is a good playback machine, but it's seriously hampered by its remote control.



Unlike the Denon, which had poor response, or the SAST, which had a poor battery cover, the Pioneer's problem is more basic. The button layout is terrible and every button is the same size. The basic playback buttons are hidden in a field of other buttons, making it easy to press the wrong button. About the only thing in this remote's favour is that it is the smallest of the full-sized players that we looked at. Remotes are devices of convenience, and a

good remote must have buttons that are easy to identify by touch. The Pioneer remote is almost the reverse.

There wasn't a lot separating the DVD players we looked at, but little things make a big difference. The Pioneer system looks good and plays well, but is let down by the poor design of its remote.

Pros Good playback
Cons Terrible remote

Contact Campsie HiFi
Phone (02) 9750 4000
Online www.pioneerelectronics.com
Price \$749

SAST AEP-803

As the cheapest of all the players we looked at, you'd expect the SAST to be low on features. Actually, the reverse is true. However, it isn't the most visually appealing unit we looked at.

The layout on the SAST controller is acceptable, but the play button could be a little bigger. The only real problem with the remote is the battery cover. Instead of a small plastic latch to release the batteries, the SAST player has an easily breakable piece of stiff plastic.

Playback on the SAST was reasonable. It was the only player with a zoom control on the remote but, as most DVDs are sourced from film originals, they don't look too good zoomed in.



One feature that's bound to sell plenty of SAST players is its ability to make the unit multiregion with a hidden menu. The menu isn't easy to find or configure, but the feature is valuable.

The SAST only comes with composite cables (video, left/right audio), but it supports 5.1 Dolby audio output, S-Video and Optical Video outputs.

The player also supports VCD playback and, oddly enough, MP3 playback for CDs

containing MP3 music. However, the controls for MP3 playback aren't brilliant, so it's only really useful if you don't have a PC available.

Pros Inexpensive
Wide range of features
Plays MP3 CDs
Cons Poor remote casing
Average playback

Contact FreNETic
Phone (02) 9660 3388
Online www.saste.com
Price \$499

Sony DVPC670D

The Sony DVPC670D was the most impressive of all the DVD players we looked at. However, at \$999, we should be impressed — it's double the price of the cheapest system.

- Pros** Five-disc playback
High quality visuals
Great remote
- Cons** Slow track searches
Five discs really only good for audio

Contact Sony
Online www.sony.com.au
Phone 1800 226 429
Price \$999



The system is a five-disc player of the type usually associated with audio CD systems. It's great for multiple CD audio playback, but there's no facility to play random chapters or tracks across DVD titles.

The Sony had the best remote layout, with a thumbpad joystick at the base of the unit, and large play and stop buttons. It is pretty chunky, so if you've got small hands, it might not be for you.

The unit provided excellent playback for most titles, but it easily had the longest seek times between tracks when playing *Dragon's Lair*. This isn't a problem for normal movie watching, but if you like skipping around films it could be a problem.

The DVPC670D has enough outputs to please any DVD lover, with digital video, composite, optical and 2/5 speaker audio.

However, the Sony is the only player we looked at that has two of most of its inputs, allowing for multiple output sources. This is great for putting music and images onto multiple screens.

An interesting feature is its ability to save scenes from movies to use as a back-drop when movies aren't playing — or when audio CDs are.

The DVPC670D is a quality player, and if you can afford it, a great unit for home entertainment. Its five-disc capacity is dubious for DVDs, but it's great if you don't already have a multi-CD changer.

Dragon's Lair II: Timewarp DVD

Dragon's Lair II: Timewarp is a version of a very old arcade game adapted for DVD players. It's been available on PC for years, but the idea of a game that you can play with the remote control of a consumer DVD player intrigued us. Did this intrigue translate into enjoyment? Well, no.

It's well suited to the DVD format because the original arcade game ran on a laserdisc player with joystick controls. You control the actions of Dirk the Daring, setting out to rescue Princess Daphne. The old fantasy plots never die, do they?

To play *Dragon's Lair* you *must* have a DVD player capable of NTSC playback. This isn't the same as a multiregion DVD, although most DVD players can handle

NTSC. When testing with the SAST system set to PAL playback, the game had an annoying tendency to switch aspect ratios between movement.

You also need a player with a good button layout. We tested *Dragon's Lair* with our five players, and found that the wide button layout of the SAST player worked well and the Sony's joystick was satisfactory. However, the others were handicapped by problems with their remotes, such as poor button layout and poor infra-red response.

Most of all, you need a lot of patience. *Dragon's Lair* is hard — very, very hard. You control Dirk and, at predetermined points in the animated narrative, you have to select a direction or the select button to make Dirk move or act to avoid getting killed.

The game's creators are clearly on something not readily available to the public, as the narrative includes killer cats, frumious bandersnatches and talking time machines. However, most of the time you'll be too busy trying to remember the sequence of moves to notice. It also suffers from a lot of lag. As each action or failure is a different track, *Dragon's Lair* is a good test of how well your player can handle track searches. There's also an option to set slow moves, so that faster DVD players won't kill Dirk while waiting for a response, but the trade-off is a guaranteed two-second pause between animations.

The game intermittently swaps to a mirror version of a scene, so you need to reverse all your moves. This should enhance the gameplay, but we found it annoying.



Sony DVPC670D

Highly commended

SAST AEP-803

The wide range of prices and the big difference between high-level and entry-level machines made it very difficult to decide on the Editor's Choice. Oddly enough, the two best machines we looked at were the most and least expensive (in that order). The Sony has more features than you're likely to use, and incorporates a five-disc playback option for not much more than single-disc players. The SAST unit represented good value for money, and didn't exhibit the design flaws in the remote that the other two units had.

The DVD includes the full animation movie, production samples from the animation, and previews for similar DVD titles.

Dragon's Lair II shows its age and isn't much fun to play. DVD gaming is a promising idea, but with Sony's PlayStation2 set to deliver console gaming and DVD playback, the remote-controlled game genre will probably remain small.



- Pros** Neat concept
- Cons** Poor execution

Contact EzyDVD
Online www.ezydvd.com.au
Price \$30.95

Great games you've never heard of

Every year, hundreds of games are released. Some become classics and spawn sequel after sequel until you're sick of hearing about them. Many do well, but never make it past a first instalment. Others, fine games in their own right, sink without a trace. APC takes a look at classic games that just seem to have fallen by the wayside.

Stunts

Before there was Gran Turismo or Need for Speed, there was Stunts, also known as 4D Sports Driving. We're not sure where the 4D idea comes in, but we are sure that Stunts is a lot of fun. Apart from the wide variety of cars on offer (from an F1 racing car to a family hatch), Stunts' greatest appeal is its insanely dangerous tracks which you have to survive to outrace the computer players. Unfortunately, Stunts predates true multiplayer games. It would have easily beaten Doom for pure playability had the option been available.



Head Over Heels

There was a time when nothing beat an isometric puzzle game, be it Knight Lore, Solstice or Batman. The king of them all was undoubtedly Ocean's Head Over Heels, a strange tale of alien kingdoms, Prince Charles-like Daleks, doughnut guns and some truly inventive puzzles. You play two hound-like critters, Head and Heels. Often Head and Heels need to separate, requiring you to use their individual powers (Head can jump high, Heels is fast) to solve each puzzle. Head Over Heels is a classic game, and seriously overdue for an update.



Subspace

In 1996, Jeff Petersen and Rod Humble wrote a 'test' game called Sniper that supported modem players over the Internet. They took Asteroids, gave it a facelift and made it competitive. Squads formed to play variants including capture the flag and powerball. The retitled Subspace was released in late 1997 with a hastily written manual, but it never reached Australia. Those who imported a copy remember Subspace as the online game before Quake. VIE closed its inhouse servers, but a Subspace community still exists.



Scorched Earth

If you've played Worms, you've played Scorch with fancier graphics. Or Artillerus on the Amiga. Or Tanks. It's a common formula — take a tank, a basic knowledge of ballistics and try to kill your opponents, all in glorious 2D. For a game that works quite happily on a 286, Scorched Earth runs fantastically well and is capable of eating up vast amounts of your time. At last, there's a responsible way to use nuclear weaponry against your friends. Worms is technically an update, but it's too cute for its own good. We want WAR!



Twisted Metal: World Tour

Peter Weir's *The Cars That Ate Paris* has a lot to answer for. Twisted Metal: World Tour, for a start. Titles like Carmageddon have sold millions with excessive gore, but Twisted Metal: World Tour concentrates on what most drivers really want — a pink caddy with a flamethrower attachment. Twisted Metal started life as a PlayStation game, and a PC version, World Tour, followed. With mine laying, mime squashing and gigantic killer ice cream vans, Twisted Metal: World Tour is definitely worth finding.



A good sci-fi read, *Net profits* and how to find information online.

Turning a profit on the Net

Teranesia

Greg Egan is one of the best science fiction authors alive, and what's more he's Australian. Forgoing the sci-fi convention of unrealistic technologies, Egan's books are based in solid scientific theories and proofs — although they're often taken to extremes. The central scientific theme in *Teranesia* is very timely, and not as complex or confusing as the themes explored in his other books (such as multidimensional universes or quantum realities).

The book follows the life of a boy named Prabir, beginning when he is nine years old and living on an island he calls Teranesia in the Indonesian ocean with his younger sister and entomologist parents. They are the only inhabitants of

the tiny island, except for the butterflies his parents study and the fantastical animals Prabir invents in his mind.

Years later, biologists start to discover a peculiar array of new creatures in the area. Prabir's sister

Maddy is drawn back to the Indonesian islands in the excitement of discovery, and Prabir enlists the help of a biologist to take him around the islands too. Both Maddy and Prabir are converging on Teranesia, but Prabir has a reason for trying to reach the island before Maddy does.

Genetic adaptability and evolution are dealt with in an interesting way in *Teranesia*, but instead of finishing with a definite conclusion, Egan leaves many questions unanswered. *Teranesia* is not as long or involved as his other novels, but it is certainly an interesting read.

Darren Ellis



Author Greg Egan
Publisher Gollancz
Distributor Allen & Unwin
Phone (02) 8425 0100
Price \$27.42
ISBN 0575068558
Rating ■■■■■■■■

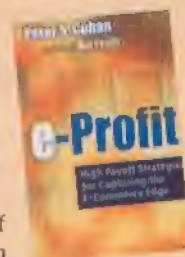
e-Profit: High Payoff Strategies for Capturing the E-Commerce Edge

Ecommerce sales are predicted to reach \$1.2 trillion by 2002, so it's no wonder businesses are investing obscene amounts of money in strategies to capture market share.

e-Profit is aimed at managers of businesses of all sizes, and provides a detailed yet practical blueprint for assessing, developing and implementing ecommerce strategies. The importance of measuring return on investment is emphasised, and strategies for doing so are provided throughout.

e-Profit provides an excellent framework for ensuring your organisation benefits from the transition to ecommerce. It covers the economics of ecommerce, managing the transition, and building the ecommerce infrastructure.

The book includes detailed case studies and, unlike similar titles, they are adequately contextualised and add a lot of information.



Also provided are methodologies and principles that can be applied readily to your organisation, on topics such as evaluating ecommerce applications, building effective ecommerce architectures, evaluating suppliers and negotiating deals.

e-Profit is one of the most comprehensive books of its type, and is essential reading for managers struggling to deal with the impact of the Internet on their business.

Cathie Kennedy

Author Peter Cohan
Publisher AMACOM
Distributor McGraw Hill
Phone (02) 9415 9899
Price \$59.95
ISBN 0814405444
Rating ■■■■■■■■

Virgin Internet Series

Virgin's pocket-sized Internet guides cover all the information you need to know to plan your travel, take care of your money, protect your family, download music and go shopping on the Net.

Virgin has found the most useful, well-designed and well-maintained Web sites. It lists thousands of sites. As well as straight site listings, they include a wealth of additional information.

The abundance of great listings in the guides can make finding one that interests you directly an exhausting experience. However, the guides are

easy to read and fun. Each Web site has a concise, informative summary and is well categorised. Along the way, sidebars provide handy hints and fast facts, and each guide contains an index, glossary and FAQ section.

These guides were published for UK readers, so unfortunately many sites will be of little use to the Australian consumer.

Corrina Frankham



Authors Simon Collin, Dominic Wills, Ben Wardle, Davey Winder
Publisher Virgin Publishing
Distributor Penguin Books
Phone (03) 9871 2400
Price \$14.18 each
ISBN Family Internet 0753504154
Internet Music 0753504855
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Internet Money 0753504464
Rating ■■■■■■■■

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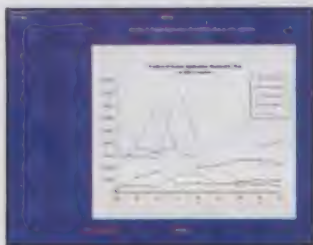
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Action stations

The Net adds a whole new dimension to the concept of political activism. Check out some of the hot issues that sparked fiery public debate and made it onto the policy agenda this year.

Refugee Council of Australia

RCOA is a nonprofit peak body that promotes "the adoption of flexible, humane and constructive policies towards refugees, asylum seekers and displaced persons", an important task considering the Australian Government's documented human rights abuses of illegal immigrants and the negative media surrounding the arrival of 'boat people' to Australia. RCOA provides an independent and informed perspective on a sensitive policy issue.



Online www.refugeecouncil.org.au
Rating ■■■■■■■■

Vanessa Fazzino

Australian Gene Ethics Network

Genetically modified foods and animal cloning are frequently debated topics in the media. Both are taken up on the Australian Gene Ethics Network (AGEN) Web site, although not in much detail. There's a good variety of links, and useful contact details for lobbying ministers about genetically engineered foods, but coverage of current issues is disappointing. All of its few 'Update' items are more than a year old. Perhaps AGEN's newsletter is more current; you can subscribe to it from the site.



Online www.geneethics.org
Rating ■■■■■■■■

Suzanne Fraser

Australia Tibet Council

Reflecting the vigour of the small Tibetan exile community in Australia, the Australia Tibet Council (ATC) Web site is appealing and up to date. The site mixes reports on world events relevant to Tibet with detailed and reliable articles on Tibet's political situation, history and culture. You can download a video clip, browse merchandise or make contact with local branches of the ATC. It'll also keep you posted on the Dalai Lama's 2001 Melbourne visit.



Online www.atc.org.au
Rating ■■■■■■■■

Suzanne Fraser

Council for Aboriginal Reconciliation

This site focuses on Corroboree 2000 (the fifth National Reconciliation Week) held earlier this year. It also contains a wealth of other information: the council's strategic plan, discussion papers, publications, speeches and media releases, as well as the Draft Declaration for Reconciliation and the council's strategies to have it realised. Its social justice library provides access to documents and reports not otherwise available over the Net.



Online www.austlii.edu.au/au/orgs/car
Rating ■■■■■■■■

Gail Lipscombe

Electronic Frontiers Australia

Electronic Frontiers Australia (EFA) promotes a range of civil liberties causes such as freedom of speech on the Internet, electronic privacy and intellectual property protection. The Web site includes copies of its submissions to Parliament and correspondence with various government agencies. It's a very simple Web presence that provides useful insights into the Australian political process.



Online www.efa.org.au
Rating ■■■■■■■■

Andrew Colley

HEMP

HEMP (Help End Marijuana Prohibition) is a South Australian political party campaigning to end the long-running war on drugs in Australia. HEMP's mission is to have the cultivation and use of cannabis legalised, and it is committed to smashing the 'cone of silence' surrounding this issue.



Online www.hemp.on.net.au
Rating ■■■■■■■■

The site, which actively encourages new recruits to enlist in the campaign for drug law reform, demonstrates how the Net can be used as an effective political weapon.

Vanessa Fazzino

IndyMedia

Launched in Seattle just before the protests against the World Trade Organisation last November, IndyMedia published articles, photos and video footage from the activists, who felt their views were trivialised or ignored by the mainstream media.



Online www.indymedia.org
Rating: ■■■■■■

The software behind IndyMedia was created by Community Activist Technology (CAT), the Sydney-based group who also set up active.org.au. There are now IndyMedia Centres (IMCs) all around the world. Sydney IMC aims to provide unbiased coverage of the Sydney Olympics.

Glenn Phillips

McSpotlight

McSpotlight was created in response to a libel action undertaken by McDonald's against activists who distributed an anti-McDonald's



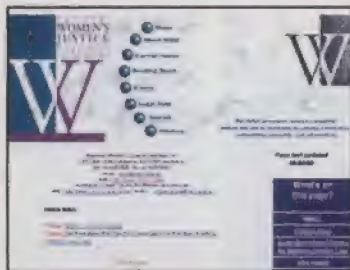
Online www.mcspotlight.org
Rating: ■■■■■■

pamphlet to its customers. After two and a half years in court, several of the pamphlet's claims were upheld. The trial was a very costly public relations disaster, and McDonald's was awarded just £60,000 in damages, none of which it has any hope of recovering. The site is a focal point for antiglobalisation activities. It monitors McDonald's closely, and promotes similar campaigns around the world.

Andrew Colley

National Women's Justice Coalition

Focusing on the Australian legal system's troubled relationship with women, the National Women's Justice Coalition Web site is packed with links and information. Full-text scholarly articles, an up-to-date monthly 'what's on' and 100 facilitated email lists can



Online www.nwjc.org.au
Rating: ■■■■■■

be found here, as well as a very interesting case-watch page. The main page is let down by poor attention to aesthetics: it's grey and utilitarian and covered with untidy-looking links. Still, the site is easily navigable and constitutes a rich and thought-provoking resource for those interested in women and the law.

Suzanne Fraser

Rattle the Cage

If you've always aspired to being a great political, social or environmental activist, but you don't have the time to be active, then this ingenious site is ideal. Select a sample protest letter from the extensive list of issues, modify it to your liking, then



Online www.rattlethecage.com
Rating: ■■■■■■

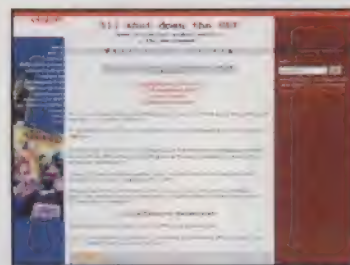
send it to the relevant politician, dignitary or other influential Australian.

Excuse me, I have a letter to write: 'Dear Mr Costello, the amount of taxpayers' money that you have spent on GST propaganda is totally immoral. It is obscene that hundreds of millions of dollars have been given to your cronies...'

Vanessa Fazzino

S11.org

S11 is a loose coalition of activists who have come together to protest against the World Economic Forum in Melbourne in September. It achieved global notoriety in June, when anonymous hackers redirected the Nike.com site to



Online www.s11.org
Rating: ■■■■■■

S11.org.

The site is being used by activists to coordinate their response to the forum, but it is also being closely watched by journalists and police, in case the protests turn out to be as big as the anti-WTO rallies in Seattle last year.

Glenn Phillips

Territorians for Effective Sentencing

This group comprises members of the legal profession, church groups, youth organisations and women's groups, and is supported by a number of politicians. The site is dedicated to repealing the Northern Territory's mandatory sentencing laws and provides links to



Online ms.dcls.org.au
Rating: ■■■■■■

further information, such as the act and the Senate inquiry into it. The group opposes the legislation on the grounds that it violates basic human rights and discriminates against the Northern Territory's poor and dispossessed. It recommends instead that resources be channelled into addressing the social causes of crime.

Gail Lipscombe

A hard edge

Downtime

Downtime is at the forefront of the Australian hardcore scene and 'Monkey' has been an incredibly popular download. The band keeps fans supplied with a range of free downloads. Visit the Downtime site for live video footage and a preview of new material from their forthcoming album.

"The Internet is the ultimate way for us to have a close and personal relationship with our friends and fans, without

any boundaries," Matt from Downtime told APC.

Matt is optimistic about the potential of the Net for music. "Now with broadband Internet access becoming more available, multimedia is taking off in more ways than one. Within our budgetary restraints, we have tried our best to broadcast entire shows in full screen streaming video for fans who are unable make it to our shows," he said.

Both tracks featured on this month's CD are from Downtime's latest album, *Tooth & Nail*. 'April' is also part of the ChaosMusic selection on the cover DVD. Downtime is supporting Pennywise on the NSW leg of their tour in November.

Tracks April

Monkey

Online www.downtime.com.au



Dreadnaught

Down to Earth, Dreadnaught's third album, mixes dark melodies and hard metal into a smooth concoction with a strong kick. It's available on the Dark Carnival label and was recently released in the US. The band has been back in the studio recording a new EP due for release late this month.

The Dreadnaught site carries plenty of news and free downloads, including live tracks, for anyone who owns a Dreadnaught CD. Metal Shop (www.metalshop.com.au) also provides samples of

tracks from *Down to Earth*, and you can buy the CD directly from the site.

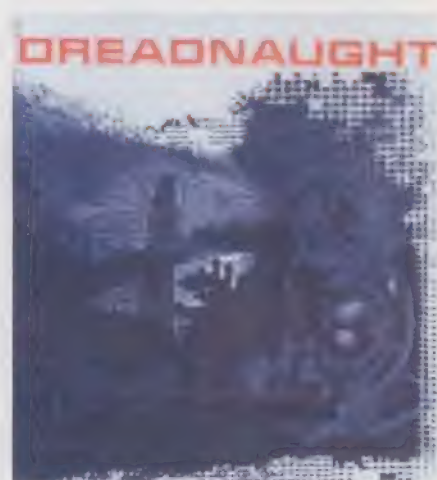
Dreadnaught guitarist Richie told APC that the Net is the only avenue for many under-age fans to access underground metal. With this loyal audience in mind, Dreadnaught recently played a string of all-ages gigs, and is performing at the huge Metal for the Brain festival at Canberra University on October 28, alongside Voi Vod, Alchemist, Sadistik Exekution, Blood Duster, Cryogenic, Frankenbok, The Wolves and many more acts.

● Visit apcmag.com for a chance to win a copy of Dreadnaught's new album, *Down to Earth*.

Tracks Game

Blue

Online www.dreadnaught.com.au



Heifer

Sydney band Heifer is a hit, not just on Triple J but also on MP3.com.au, with the title track from their debut EP 'Mark Mark'. The lyrics, about guitarist Andy Love's first experiences in Thailand, are in Thai (*mark mark* means 'very very').

Heifer decided to release the crunching guitar track as a free MP3. The band's vocalist Rob Smith said, "We saw MP3 as a tool for getting our stuff out there. There are samples of the EP on the Web site as

well. If they just want 'Mark Mark', they can download it for free. Hopefully they'll pass it on to other people as well!"

The EP is available from the Heifer Web site, and was released by independent label Something For Now, run by friends of the band. "We want to do things our own way and keep total control," bass player Matt Lyon said.

"If we want to give songs away in MP3, we don't want to have to go cap in hand to the label. We also don't want anyone but us deciding what lyrics we should write, what songs should be released, or anything else."

'Mark Mark' is also included in the MP3.com.au selection on the DVD.

Track Mark Mark

Online www.heifer.com.au



It's time for some rock, so turn it up loud and terrify
the neighbours. *By Vanessa Richardson*

Oversize

Characteristic jumpy beats and heavy grooves feature in the two tracks by Oversize included on this month's CD. The band has made some line-up changes and polished up a new set to perform in Melbourne.

"MP3 has been great for Oversize as it has enabled us to get a great deal of exposure. It also gives punters and fans who see the band the chance to go home and check it out again," Oversize bass player Andrew said. 'Learn to Unlearn' is also included in the MP3.com.au section of the cover DVD.

Tracks Learn to Unlearn
Eating Cabbage

Online www.rippledigital.com.au/oversize



Rhubarb

The success of this Brisbane guitar pop outfit has extended to the Net. 'Exerciser' was the favourite track in the recent Downunder Downloads competition run by ChaosMusic and amplified.com. As its prize, Rhubarb will be performing in Los Angeles in November, as part of a US tour. 'Exerciser', from Rhubarb's debut album *Kamikaze*, is featured on this month's CD, and it's also included as part of the ChaosMusic selection on the cover DVD. 'Nice Girls' is the latest single from the album.

Track Exerciser

Online www.rhubarb.org



Vicious Hairy Mary

Vicious Hairy Mary walk a wobbly tightrope between circus and heavy rock, so it's no surprise that this Sydney-based band is known for its explosive live performances. A diverse repertoire of instruments, including megaphone, electric violin and accordion, create the unique sound on these tracks, from the band's debut album, *Orchestra Phantasma*. 'Collide'A'Scope' is also part of the ChaosMusic selection on the cover DVD.

Tracks Collide'A'Scope
Spyro

Online www.magnusmusic.com.au/O_VHM.html



Videorama

As a special feature this month, seven videoclips from artists previously featured in Random Notes are included on APC's cover DVD.

- Grey Area
'Modular Drift'



- The 5000 Fingers of Dr T
'The Butt Squeezing Factory'
'The Funk Police'
'Mr Love Bass'
'Barbecued Crickets'



- Prymer
'Tell Them Not Me'
'Tell Them Not Me (Seiji Remix)'

There are also videoclips from Gerling, Sonic Animation and Rumanastone (provided by Festival Mushroom) and 80 tracks from MP3.com.au and ChaosMusic. More information about the artists is available on the DVD.

Tracks this month

All 10 tracks featured in Random Notes this month are available on CD 1 of the cover CD pack.

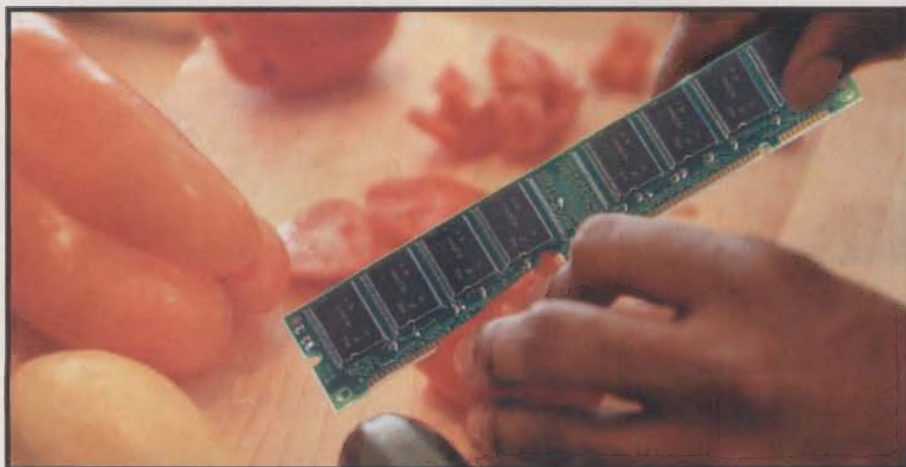
The tracks from Downtime, Rhubarb and Vicious Hairy Mary were supplied by ChaosMusic. For more information on these bands and to buy their albums, visit their pages on www.chaosmusic.com.

The tracks from Heifer and Oversize were provided by MP3.com.au and you can check out the pages of both bands on its Web site. New tracks and artists are constantly appearing on the site.

The tracks from Dreadnaught were provided by Roadrunner Records. Visit Metal Shop (www.metalshop.com.au) to buy CDs from Roadrunner Records.

Cooking up a storm

Many APC readers complain that they spend so many hours at the keyboard there's no time left for proper cooking. But with a little imagination, your computer can become your best friend in the kitchen. Just check out our selection of handy hints.



PRIZE HINT If your favourite kitchen knife is blunt, try slicing vegetables with an old SIMM card.

- To add a techno flair to cookery, refer to your favourite recipes as 'sauce code'.
- There are thousands of Web sites out there featuring creative, nutritious meal ideas. We suggest you avoid them, since you'll inevitably get distracted and end up downloading MP3s instead.
- Dental hygiene after meals is vital. If you can't find a toothpick, use the stylus from your handheld.
- Crush garlic by placing the cloves inside the printhead of an old dot-matrix printer and printing out copies of 'The Cathedral and the Bazaar'.

In extreme conditions, condensation can form in your PC's case. Why not use it as a tasty marinade?



Defrost slices of frozen bread by placing them inside your PlayStation.

- Make a fruit salad by combining Apple's iMac colour range: blueberry, strawberry, lime, tangerine and grape. (This doesn't work so well with the new indigo/ruby/sage/snow range.)
- Stuck with a heap of worthless dot com shares? Use them as barbecue fuel.
- Test whether cakes are cooked by skewering them with USB cables.
- Palm recently introduced a special Claudia Schiffer edition of the PalmPilot. This has nothing to do with cooking; we just thought you'd like to know.
- There's no need to waste money on an expensive juicing machine. Instead, drop your monitor repeatedly on a pile of soft fruit.
- When in doubt, dial for pizza.

Quick and Easy

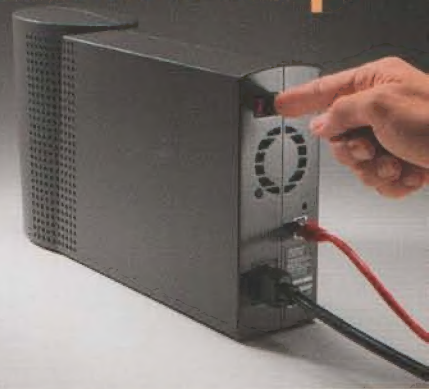


Don't waste all the heat coming out of that overclocked PC. Simply place steaks or chops on the casing or monitor and let them cook through slowly. Your meat should be ready at about the same time your motherboard fries.



Mash bananas simply and easily by peeling them, placing them in your CD tray, and then opening and closing it repeatedly.

Plug it in, turn it on. Now adding a file server is a Snap!



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